STUDIES IN TEACHING AND TEACHER BEHAVIOUR

EDITOR
M. B. BUCH

CENTRE OF ADVANCED STUDY IN EDUCATION
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PREFACE

The Centre of Advanced Study in Education decided to study the process of teaching and teacher classroom behaviour in 1970. The importance of this field of study was already underlined internationally through the publication of the monumental work edited by N. L. Gage, namely, ' Handbook of Research on Teaching ' and by the presidential address of Professor S. K. Mitra at the Psychology and Educational Science Section in the 67th Indian Science Congress in the year 1970. Three national seminars were held in 1971 and 1972. More than a dozen research scholars initiated studies in this area. The exploratory work completed during 1970 was first published under the title ' Communication in Classroom ' in 1971. During the next two years three more brouchers were published, namely, ' Psychology of Teaching ' —national lectures by Professor S. K. Mitra, ' Report of the Third National Seminar ' and ' Review of Research on Theory of Teaching ' by S. P. Bhattacharya. By 1974, nine studies in the area of teaching and teacher behaviour were completed. Eight out of nine studies were undertaken by scholars as part of their doctoral work. Incidentially, all of them have worked under the guidance of the editor. The present volume is the fifth publication in the area of teaching and teacher behaviour. It is hoped that this volume would provide needed information about research on teaching to Indian researchers.

Special thanks are due to Dr. N. K. Jangira for editing the manuscript during the first phase. The editor also thanks Miss M. S. Lalitha of CASE for having gone through the manuscript and the proofs with meticulous care. He acknowledges the help extended by Mr. S. Roy, Mr. T. Singh, Mr. D. N. Sansanwal, Dr. (Mrs.) Sudesh Mukherjee and Mrs. Bimla

Passi in the arduos task of proof reading. Last, but not the least, thanks are due to the professional friends who were associated with the Cooperative Project on Productive Teaching (the report is presented in Chapter 2 of this volume) for their cooperation in the completion of the national study.

Centre of Advanced Study in Education
M. S. University of Baroda, Baroda
January, 1975

M. B. BUCH

CONTENTS

PREFACE v

CONTRIBUTORS ix

CHAPTER 1

Research in Teacher Behaviour in India—Retrospect and Prospect
M. B. BUCH AND N. K. JANGIRA 1

CHAPTER 2

Interaction Patterns in Indian Classrooms
M. B. BUCH 8

CHAPTER 3

Teacher Classroom Behaviour in Relation to Non-Personality Variables
M. R. SANTHANAM 28

CHAPTER 4

Teacher Classroom Behaviour with Reference to Teacher Personality Variables
Z. M. QURAISHI 48

CHAPTER 5

Effect of Teacher Influence on Pupil Achievement
T. P. LULLA 69

CHAPTER 6

An Inquiry into the Relationship between the Pupils' Attitudes and Teacher Influence in the Classroom
Y. PATEL 77

CHAPTER 7

Relationship between Patterns of Teacher Classroom Behaviour and Pupils' Attainment in Terms of Instructional Objectives
S. SHARMA 90

CHAPTER 8

Effect of Feedback from Different Sources on the Classroom Behaviour of Student Teachers
N. N. PANGOTRA 128

CHAPTER 9

Interaction Analysis, Microteaching and Modification of Teacher Classroom Behaviour
L. P. SINGH 153

CHAPTER 10

Effect of Classroom Behaviour Training on the Classroom Interaction Patterns of Student Teachers and Pupil Outcomes
N. K. JANGIRA 173

REFERENCES 237

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1

RESEARCH IN TEACHER BEHAVIOUR IN INDIA—RETROSPECT AND PROSPECT

Backdrop

The importance of the teacher is increasingly being felt in the teaching-learning process. Once Whitehead wrote, 'everything depends upon the teacher'. The validity of the statement holds good even today. Hardly anyone doubts, if it is asserted, that the quality of teachers mainly depends upon the quality of teacher training programme. National institutions, state level institutions and universities have taken some measures for revising the teacher preparation programmes, upgrading the entrance requirements in colleges of education and providing programmes for in-service education of teachers. These measures, however, have not proved to be effective. There is a large gap between what is taught in the training colleges and what is observed in the classrooms. In other words, the prospective teachers remain almost the same even after training. One of the major reasons for these futile efforts is the lack of sustained research to improve teaching and teacher preparation. Most of the measures introduced hardly have any research base or any empirical evidences for their implementation. Further they are mostly related to the structural or organizational changes and to the modifications in the area of content or curriculum. The importance of the area of process of education is rarely felt either by the agencies which implement various reforms or by the researchers. "In a comprehensive survey of research in the area of education, it is evident that the number of studies done in this area is negligible" (Buch, 1974). This has led to the inadequacy of the data regarding the effective teacher behaviour or teacher acts. Teacher

M. B. BUCH AND N. K. JANGIRA

educators are not clearly aware of what teacher behaviour has to be developed among student teachers. Hence, they have resorted to the global concepts of methods of teaching suggested by philosophers and psychologists (Smith, 1963). Even the process of transmitting the behavioural characteristics to the prospective teachers is of doubtful validity.

Need for Rethinking

The backdrop suggests the need to ponder again over the existing situations in classroom teaching and teacher education. It also suggests a need to shift the emphasis from organization and content to the process of education. This does not, however, mean that the first two should be eliminated from our educational programmes. But the stress should be on the process. This need has not been realized strongly by educational reformers, thinkers, practitioners and research workers. Secondly, there is a need to find out the effective teacher behaviour through well designed research, taking into account the actual process of classroom teaching. Thirdly, there is a need to design effective techniques of teacher training. Effective techniques imply those which produce specified teaching behaviour not only in prospective teachers but also in in-service teachers. Fourthly, it is high time for the administrators to improve and modify the prospective educational programmes and policies in the light of the emerging knowledge. In conclusion, there is a great need to conduct researches in the areas of classroom teaching, teacher behaviour and teacher education. This is a must, especially in developing countries like India. Reforms planned in the educational programmes should be in the light of the above researches.

Early Attempts in India

Research in teacher behaviour and in actual classrooms is still in its embryonic stage in India. In 1963, Mehta prepared a manual on classroom behaviour which was published by the National Council of Educational Research and Training in 1967. This manual discusses the 'dominative' and 'integrative' teacher behaviour and stresses the role it plays in the development of classroom climate. Late in sixties, Mehta organized a number of Indian Laboratories on Achievement Motivation (LAM's) for teacher educators and teachers to raise the level of motivation, training them in goal setting behaviour and helping them to understand and develop suitable classroom instructional behaviour with a view to developing friendly and warm teaching-learning climates. Pareek and Rao (1971b) in their study modified classroom verbal behaviour from direct to indirect using Flanders Interaction Analysis and studied its relationship with some measures of pupil adjustment. Roy (1970) conducted his study dealing with the modification of teacher behaviour.

Research attempts were sporadic in the area of teacher behaviour until 1970. It was in the year 1970, the Centre of Advanced Study in Education, Baroda, took up the area of teacher behaviour as one of its major areas of study. It organized the first national seminar on *Classroom Interaction Process Analysis and Teacher Behaviour* with a view to orienting selected teacher educators and research workers to research developments in the area of teacher behaviour, to enlist support for undertaking studies in that area in different parts of the country and to develop a co-operative strategy to implement them. In the subsequent national seminar on *teacher behaviour*, the work was reviewed and new directions for further work were outlined. These efforts have resulted in a series of studies on: (a) teaching, where the effectiveness of selected classroom behaviour patterns of teachers is investigated and (b) modification of classroom behaviour of teachers, wherein new techniques are tried out to study their effectiveness.

Buch (1970) undertook a study in the area of *teacher behaviour* under the Co-operative Project on Productive Teaching (COPPT), which gives a picture of what goes on in Indian classrooms, particularly in secondary social science and humanity classes. The next two studies fall into the area of 'presage-process' research. Quraishi (1973) studied the relationship between classroom behaviour of teachers and their personality traits and attitudes. The other study is by Santhanam (1973), wherein he found out the relationship between the classroom behaviour of teachers and their demographic variables like age, sex, marital status, experience, recency of training and curricular subjects taught. These are followed by two 'process-product' studies. Lulla (1974) studied the influence of teacher behaviour on achievement of pupils. Sharma (1972) conducted an experiment to study the effect of four different patterns of classroom behaviour of teachers upon achievement of pupils. Jangira (1973) as a part of his study in teacher education also reports 'process-product' results. The next three studies that follow are in the area of teacher education dealing with the modification of teacher behaviour. Pangotra (1973) compared the effects of different sources of feedback on the classroom behaviour of student teachers during the student teaching programme. Singh (1974) compared the effectiveness of Flanders Interaction Analysis, microteaching and conventional approach in student teaching programme. Jangira (1973) in his study arrived at a model to evaluate a part of teacher education programme, namely, student teaching. In this model, the classroom interaction patterns of the teachers were modified in the training institute, and their sustenance was studied in the field when the student teachers became regular professional teachers. These patterns of interaction were also compared with the adjustment of pupils under the charge of teachers under study.

A number of studies, other than reported in the present book, are in progress in the CASE and other institutions. These studies when completed will be reported later on.

Future Directions

The studies included in this volume may give an idea that limited dimension of the area has been covered. This is because the studies conducted elsewhere were to be replicated to compare the results. This does not, however, mean that research workers are not aware of this fact. It is encouraging to note that there is a widening of the horizon of studies in progress and the forward looking thinking of the research workers engaged in this area. A few suggestions for further work can be offered in the area with a view to stimulating thinking.

Any research carried out in future should be based on a theoretical framework within a suitable model. Sporadic researches are of little use and it will be difficult to integrate them and draw conclusions. Programmatic research may be encouraged. There should be a co-ordinating agency to integrate research work in this area. The CASE is doing this function. It has worked out a theoretical framework in this area during the *third national seminar on Research in Teaching*. Research may also be undertaken outside this model, either to contribute to the knowledge within the model or to enrich the model itself. Apart from individual research work, institutional or co-operative studies also will have to be undertaken.

Secondly, more attention will have to be given to the design and analysis of the studies which may otherwise lead to invalid and unreliable results and mislead the consumers of those researches. In carrying out any study, it is better if a statistician and educational research worker put their heads together and work co-operatively to avoid, as far as possible, the analysis and interpretations from becoming invalid and unreliable.

Fresh thinking may be done with regard to the tools and research procedures available in the area of teaching, teacher behaviour and teacher education with a view to improving them. Either the existing tools may be modified or new tools may be developed depending upon the purposes of the studies. To develop valid tools in cognitive and psychomotor domains is highly difficult, hence the studies in the area of classroom teaching and teacher behaviour are negligible in number. Such tools have to be developed if the scope of the area has to be broadened. For serious research, at least the research institutions like the CASE and the NCERT will have to be provided with sophisticated gadgets like video-tape, CCTV, etc. They facilitate the analysis of the complex phenomenon like teaching.

In most of the studies in the area of teacher behaviour, the latter has been considered as an independent variable to see its effect on pupil outcomes. Studies may be conducted by manipulating pupil variables to see its effect on teacher behaviour.

Studies included in this book and those that are in progress are on interaction between the teacher and pupils in general. Hardly any study has been conducted to find out the nature of interaction among pupils and how it affects pupil outcomes. Such complexities have to be studied now. This may require more than one observer or more than one observation or a multiple coding system. The intricate nature of classroom interaction, i.e., interaction between teacher and the class as a whole, teacher and individual students, teacher and a subgroup in the classroom and pupil interaction need to be studied in detail to enrich the area of research on teaching.

A review of the studies conducted in India and elsewhere indicates that a large number of variables in teaching-learning process have not been covered. The correlational studies have to be carried out to find out the relationships between various teacher behaviour acts in the classroom and pupil outcomes to generate new hypotheses. These hypotheses have to be tested through well designed experimental studies. Laboratory experiments may also be conducted to gain fundamental insight into the area. In all the studies done in India only the verbal behaviour of the teacher in the classroom has been taken into consideration with an assumption that verbal and non-verbal behaviour of the teacher in the classroom are highly correlated. One limitation of the study of non-verbal behaviour has been the absence of adequate tools to study. The time has come when both verbal and non-verbal behaviour are to be studied with a view to testing the validity of the above assumption as well as its role in the teaching-learning process as it goes on in the classroom.

There should be a simultaneous and adequate programme of tryout and diffusion of research in the area. This will provide the feedback to the research workers to review their approach and modify if needed. This will also pave the way for adequate support from the agencies sponsoring educational research.

Prospects

The area of research on *teaching, teacher behaviour and teacher education* is relatively new but pregnant with exciting potentialities. This is being increasingly realized in educational circles at various levels, viz., administrators, teacher educators, research workers and educational practitioners. This is appropriate also as our efforts will remain ineffective till classroom instructional strategies are improved radically. More and more support is expected to this end.

M. B. BUCH AND N. K. JANGIRA

2

INTERACTION PATTERNS IN INDIAN CLASSROOMS

Problem

For long, Indian educational researchers, as in other countries, kept on investigating teaching, sitting on the fence. They floated on the periphery and seldom entered its nucleus—the classroom. The limitations of such an approach became too conspicuous in the recent past. It is now considered quite difficult, if not impossible, to understand, describe and analyse the concept of teaching unless we decide to enter the classroom and examine first hand the live-drama as it proceeds on the stage itself. The last decade has witnessed the actual classroom transactions moving into the focus of investigations in teaching. A number of attempts to design instruments, to improvise techniques and to outline procedures for observing, recording, analysing and interpreting the classroom events have appeared on the scene.

Since we, in this country, are as concerned with the improvement of teaching as any other, it was considered imperative to examine what goes on in Indian classrooms and how it goes on. Such attempts will provide us the necessary data for understanding the transactions featuring our classrooms and will help in determining the guidelines for streamlining the same in desirable directions. The present study was envisaged towards this end under the Co-operative Project on Productive Teaching (COPPT). COPPT was organized with the specific purpose to stimulate interest in undertaking studies in the area of teaching. The members collected data on classroom interaction from schools in different parts of the country. The study used Flanders (1970) system of interaction analysis based on the 'initiation-response balance' in the

M. B. BUCH

classroom. The attempt was directed to identify the verbal classroom behaviour patterns obtaining in Indian classrooms and to compare the same with the norms given by Flanders (1970). The study covered 500 classrooms in nine states and two union territories of India.

Purpose

Two specific purposes of the present study may be stated as under :

1. to identify the verbal classroom behaviour patterns obtaining in Indian classrooms;
2. to compare the verbal classroom behaviour patterns identified in (1) above, wherever possible, with the norms given by Flanders (1970).

To a limited extent, the study also provides norms in Indian classrooms for the grade and the subject area covered. It is limited in a sense that the establishment of norms requires representation not only in terms of sample of teachers but of the classroom events as well. The twin representation in observational studies is exorbitantly costly in terms of the resources of time as well as finances. The present study could not include the representation of classroom events. But even then it provides some ideas about the interaction patterns in Indian classrooms with the limitations noted above.

Sample

The sample consisted of 500 teachers of secondary classes teaching social sciences and humanities, drawn randomly from the nine states and two union territories of India for the purposes of the present study.

Tool Used

Flanders Interaction Analysis Category System (1970) was used to observe the classes. The tool comprises ten categories, the first seven of which are meant for recording teacher talk, next two cover pupil talk and the last one records silence or confusion in the classroom. Table I gives the tool.

TABLE 1

Flanders Interaction Analysis Category System

Teacher Talk	Initiation	**1. Accepts feeling**	Accepts and clarifies an attitude or the feeling tone of a pupil in a non-threatening manner. Feelings may be positive or negative.
		2. Praises or encourages	Praises or encourages pupil action or behaviour. Jokes that release tension, but not at the cost of another individual; nodding head, or saying " um hm ", or " go on " are included.
		3. Accepts or uses ideas of pupils	Clarifying, building or developing ideas suggested by pupils. Teacher extension of pupil ideas are included but as the teacher brings more of his own ideas into play, shift to category five.
	Questioning	**4. Asks questions**	Asking questions about content or procedure, based on teacher ideas, with the intent that a pupil will answer.
	Responses	**5. Lecturing**	Giving facts or opinions about content or procedures; expressing his own ideas, giving his own explanations, or citing an authority other than pupil.
		6. Giving directions	Directions, commands, or orders to which a pupil is expected to comply.
		7. Criticising or justifying authority	Statements intended to change pupil behaviour from non-acceptable to acceptable pattern; bawling someone out; stating why the teacher is doing what he is doing; extreme self-reference.

TABLE 1 (Contd.)

Student Talk	Response	**8. Pupil-talk response**	Talk by pupils in response to teacher. Teacher initiates the contact or solicits pupil statement or structures the situation. Freedom to express own ideas is limited.
	Initiation	**9. Pupil-talk initiation**	Talk by pupils which they initiate. Expressing own ideas, initiating a new topic, freedom to develop opinions and a line of thought, liking, asking thoughtful questions, going beyond the existing structures.
Silence		**10. Silence or confusion**	Pauses, short periods of silence and periods of confusion in which communication cannot be understood by the observer.

There is no scale implied by these numbers. Each number is classificatory; it designates a particular type of communication event. To write these numbers down during observation is to enumerate, not to judge a position on a scale (Flanders, 1970).

To record classroom behaviour, the observer sits comfortably at a vantage point in the classroom from where he can see conveniently and hear the students and the teacher. He listens to the communication, decides the category that best represents the particular communication event and writes down the relevant category number simultaneously assessing the continuing communication. Observation continues at the rate of 20 to 25 per minute, almost a tally every 2.5 to 3 seconds. The observer attempts not to skip over any communication event. Any event not coming under the purview of the system, and which the observer considers can be useful later on in explaining something concerning the observations is noted down in the margin of the observation sheet. A number of ground rules are followed to take a decision about categorisation of communication events in case of doubt.

Preparation of the Matrix

Frequency of occurrence of different categories can be obtained by mere tallying. But more information can be obtained from a 10 × 10 matrix. The preparation of the matrix follows the following steps:

Step I

Add 10 in the beginning and in the end of the series of observations, if not there.

Step II

The observations are paired. In forming pairs of observations, each number is used twice, excepting the first and the last observations. The second number of the first pair forms the first number of the the second pair, the second number of the second pair forms the first number of the third pair, and so on. The pairs will look like:

10, 4, 8, 8, 2, 5, 5, 5, 4, 8, 3, 5, 5, 9, 10, *Step III. Tabulating Interaction Analysis Matrix*

The tabulation of the matrix follows a convention, whereby the first number of any pair designates the row and the second number designates the column. This way, all the 100 cells in 10 × 10 matrix have their respective addresses. Table 2 gives addresses of each of the cells.

Once observations have been grouped into pairs, the pairs can be transferred to the matrix according to their respective cell addresses as shown in Table 2. It is better, if more space is provided to the categories 3, 4, 5, 8 and 9 in rows as well as columns, as these categories usually carry higher frequencies than others and consequently form more pairs. The pairs formed in this section can be transferred to the cells in Table 3.

Computation of Classroom Interaction Variables

The meaning and the significance of the interaction variables will be taken up in the section on "Interaction Patterns in Indian Classrooms". Here only computational procedure has been given. The interaction patterns given below are computed from the 10 × 10 interaction matrix.

$$\text{Percent Teacher Talk (PTT)} = \frac{(\text{Categories } 1+2+3+4+5+6+7) \times 100}{\text{Total of all categories}}$$

$$\text{Percent Pupil Talk (PPT)} = \frac{(\text{Categories } 8+9) \times 100}{\text{Total of all categories}}$$

$$\text{Percent Silence or Confusion (PSC)} = \frac{(\text{Category } 10) \times 100}{\text{Total of all categories}}$$

$$\text{Teacher Question Ratio (TQR)} = \frac{(\text{Category } 4) \times 100}{(\text{Category } 4+5)}$$

$$\text{Teacher Response Ratio (TRR)} = \frac{(\text{Categories } 1+2+3) \times 100}{(\text{Categories } 1+2+3+6+7)}$$

$$\text{Instantaneous Teacher Response Ratio (TRR 89)} = \frac{[\text{Cells } (8\text{–}1)+(8\text{–}2)+(8\text{–}3)+(9\text{–}1)+(9\text{–}2)+(9\text{–}3)] \times 100}{[\text{Cells } (8\text{–}1)+(8\text{–}2)+(8\text{–}3)+(8\text{–}6)\ (8\text{–}7)+(9\text{–}1)+(9\text{–}2)+(9\text{–}3)+(9\text{–}6)+(9\text{–}7))]}$$

Instantaneous Teacher Question Ratio (TQR 89) $= \dfrac{[\text{Cells } (8-4)+(9-4)]\times 100}{[(\text{Cells } (8-4)+(8-5)+(9-4)+(9-5)]}$

Pupil Initiation Ratio (PIR) $= \dfrac{(\text{Category } 9)\times 100}{(\text{Categories } 9+8)}$

Content Cross Ratio (CCR) $= \dfrac{(\text{Categories } 4+5)\times 100}{\text{Total of categories}}$

Steady State Ratio (SSR) $= \dfrac{(\text{Total } 10 \text{ diagonal cells})\times 100}{\text{Total of all categories}}$

Pupil Steady State Ratio (PSSR) $= \dfrac{[\text{Cells } (8-8)+(9-9)]\times 100}{\text{Total of categories 8 and 9}}$

Miller Flexibility Ratio (MFR) $= \dfrac{[\text{Cells } (4-3)+(5-3)+(8-3)+(3-4)+(3-4)+(3-5)+(4-9)+(9-4)+(9-5)]\times \times 100}{\text{Total of all categories}}$

Data Collection

In 1970, a number of persons were trained in interaction analysis during the "First National Seminar on Interaction Process Analysis and Teacher Behaviour" at the Centre of Advanced Study in Education (CASE), Baroda. They achieved an inter-observer reliability of .85 and above during the training. These observers were given instructions regarding the collection of data from classrooms in their respective regions. Each of the 500 teachers included in the present study was observed twice for twenty-five to thirty minutes in each session. The observation data were sent by the observers to CASE, the centre of COPPT.

Interaction Patterns in Indian Classrooms

In this section, the master matrix (Table 4) containing observations for all the 500 teachers and the percentage master matrix (Table 5) have been given. The interaction patterns derived from the master matrix have been discussed and compared with the norms (wherever available) given by Flanders (1970). From the discussion emerges the image of Indian classroom as far as verbal behaviour featuring them is concerned.

TABLE 2

Cell Address in a 10 × 10 Matrix

Category	1	2	3	4	5	6	7	8	9	10	*Total* (*row*)
1	1–1	1–2	1–3	1–4	1–5	1–6	1–7	1–8	1–9	1–10	
2	2–1	2–2	2–3	2–4	2–5	2–6	2–7	2–8	2–9	2–10	
3	3–1	3–2	3–3	3–4	3–5	3–6	3–7	3–8	3–9	3–10	
4	4–1	4–2	4–3	4–4	4–5	4–6	4–7	4–8	4–9	4–10	
5	5–1	5–2	5–3	5–4	5–5	5–6	5–7	5–8	5–9	5–10	
6	6–1	6–2	6–3	6–4	6–5	6–6	6–7	6–8	6–9	6–10	
7	7–1	7–2	7–3	7–4	7–5	7–6	7–7	7–8	7–9	7–10	
8	8–1	8–2	8–3	8–4	8–5	8–6	8–7	8–8	8–9	8–10	
9	9–1	9–2	9–3	9–4	9–5	9–6	9–7	9–8	9–9	9–10	
10	10–1	10–2	10–3	10–4	10–5	10–6	10–7	10–8	10–9	10–10	
Total (Column)											Matrix Total

TABLE 3

Tabulation of the 14 Pairs

Category	1	2	3	4	5	6	7	8	9	10	*Total*
1											
2					1						1
3					1						1
4								11			2
5				1	111				1		5
6											
7											
8		1	1					1			3
9										1	1
10				1							1
Total		1	1	2	5			3	1	1	14

The fourteen pairs entered into this matrix are given on page 12

TABLE 4

Master Matrix for 500 Teachers

	1	2	3	4	5	6	7	8	9	10	*Total*
1	84	17	2	47	119	30	4	24	16	32	375
2	10	1700	855	2876	2789	923	108	4787	508	1501	16057
3	5	200	2230	1363	3161	267	40	945	187	775	9173
4	49	578	367	9963	2298	1197	237	25996	2485	8278	51448
5	48	737	158	14038	230217	2604	339	3856	2229	9587	263813
6	11	224	90	1955	2146	2924	341	4485	340	3382	15898
7	3	97	19	518	583	419	1683	500	118	760	4700
8	69	10812	4204	10706	9279	3817	921	45703	895	5733	92139
9	59	972	972	1144	2444	704	264	325	2973	1230	11087
10	37	720	276	8838	10777	3013	763	5518	1336	39788	71066
Total	375	16057	9173	51448	263813	15898	4700	92139	11087	71066	535756

TABLE 5

Percentage Matrix for 500 Teachers

	1	2	3	4	5	6	7	8	9	10	*Total*
1	.01	.00	.00	.00	.02	.00	.00	.00	.00	.00	0.06
2	.00	.31	.15	.53	.52	.17	.02	.89	.09	.28	2.99
3	.00	.03	.41	.25	.59	.04	.00	.17	.03	.14	1.71
4	.00	.10	.06	1.85	.42	.22	.04	4.85	.46	1.54	9.60
5	.00	.13	.02	2.62	42.97	.48	.06	.71	.41	1.78	49.24
6	.00	.04	.01	.36	.40	.54	.06	.83	.06	.63	2.96
7	.00	.01	.00	.09	.10	.07	.31	.09	.02	.14	0.87
8	.01	2.01	.78	1.99	1.73	.71	.17	8.53	.16	1.07	17.19
9	.01	.18	.18	.21	.45	.13	.04	.06	.55	.22	2.06
10	.00	.13	.05	1.64	2.01	.56	.14	1.02	.24	7.42	13.26
Total	0.06	2.99	1.71	9.60	49.24	2.96	0.87	17.19	2.06	13.26	100.00

A Peep into the Classroom

Duration of the recorded interaction

The total duration of the recorded interaction is given by the total tallies. The grand total of tallies in the master matrix is 5,35,756. Since, on an average, the rate of recording the observations is one for every three seconds, i.e., about 20 observations per minute, the total duration of the recorded observation works out to 446.46 hours. The master matrix includes combined observations for 500 teachers. So the average time for each teacher observed comes out to be 54 minutes spread over two sessions.

Classroom talk : Who rides the horse?

Bulk of the time in the classrooms is covered by someone talking, teacher or the student. In the classrooms under study, teachers were found to be talking sixty-eight percent of the time, while students got the opportunity to talk nineteen percent of the time. During the remaining thirteen percent of the time, either silence or confusion prevailed in the classroom. Obviously, the teacher rides the horse 3.5 times more than the students during talking sessions. The anticipated average percentages for teacher talk, pupil talk and silence or confusion based on Flanders' several years of observing are 68, 20 and 11 or 12 respectively.

Beyond the Peep

The overall distribution of teacher talk and pupil talk will become meaningful, when an attempt is made to assess their quality. This can be accomplished by working out a few ratios which provide information about teacher initiative, teacher response and pupil initiative. Flanders (1970) expects, " reciprocal relationships between teacher statements and pupil statements. That is, the more the teacher takes the initiative, the more likely the pupils are to respond. The more a teacher responds, the more likely it is that pupils will make statements which show initiative". This section discusses the interaction patterns pointing out the quality of talk.

Teacher Response Ratio (TRR)

Teacher Response Ratio indicates the teacher's tendency to react to the ideas and feelings of the students. The ratio provides an index of the emotional climate in the classroom. The computational procedure will reveal that it is a proportion of positive and affective categories 1, 2 and 3 to the total of 1, 2, 3 including 6 and 7 which are restrictive categories. TRR for the present matrix is 55.42. The corresponding value of TRR norm given by Flanders is 42. The responsiveness of the Indian teacher is higher than the American teacher.

Instantaneous Teacher Response Ratio (TRR 89)

Instantaneous Teacher Response Ratio is "the tendency of the teacher to praise or integrate pupil ideas and feelings into the class discussion, at the moment the pupils stop talking" (Flanders, 1970 : 104). TRR 89 in Indian classrooms under study was found to be 74.97. It is above the normative expectation of about 60. The high ratio of TRR 89 is due to considerable use of praise statements (obvious from cell 8-2) and low critical statements (obvious from cells 8-7, 9-7).

Teacher Question Ratio (TQR)

This ratio, as the nomenclature indicates, points to the tendency of the teacher, to ask questions during the more content oriented part of the class discussion. TQR in the present study was found to be 16.32 which is below that (26) for an American teacher.

Instantaneous Teacher Question Ratio (TQR 89)

Instantaneous Teacher Question Ratio indicates the tendency of the teacher to respond to student talk with questions based on his own ideas instead of lecture. In Indian classrooms, the ratio worked out to be 50.27. The corresponding American normative value of TQR 89 is about 44. Indian teachers follow student talk with questions more often than the American teachers.

They are more likely to switch on to a new question as compared to lecturing than their American counterparts.

Pupil Initiation Ratio (PIR)

As the name suggests, Pupil Initiation Ratio indicates the proportion of pupil talk, "judged to be an act of initiation". PIR was found to be 11 in the present study. This is much below the American normative expectation of about 34 according to Flanders. Inversely, pupil response talk constitutes the major ingredient in the total pupil talk. This may be due to the tendency of teachers to ask questions on the material he covers through lecture or may be due to the increasing use of drill pattern. This may also have a reference to the type of questions asked by the teachers. May be the teachers rarely use open or divergent questions.

Content Cross Ratio (CCR)

Content Cross Ratio indicates the emphasis given to the content coverage during classroom transactions. The CCR in Indian classrooms worked out to be 59 which is close to the American normative expectation of 55.

Flexibility in Classroom Behaviour

How often do teachers or students change their categories of behaviour? This question concerns the flexibility of classroom behaviour during teaching or the rapidity with which the behaviour changes. This is assessed through Steady State Ratio (SSR). This ratio indicates the extent to which the teacher talk and pupil talk remain in the same category for a period longer than three seconds. Teacher Steady State Ratio (TSSR) and Pupil Steady State Ratio (PSSR) indicate the index for teacher behaviour and student behaviour respectively. The higher the SSR, or PSSR, the less rapid will be the transition in classroom behaviour of teachers and students. Another index of flexibility, Miller Flexibility Ratio (MFR) used by Miller has also been worked out.

The SSR, TSSR, PSSR and MFR are 63, 69.3, 47 and 2.99 respectively. The Steady State Ratio is quite high in the case

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of teachers, but is low in the case of students. The counter flexibility MFR is quite low. Flanders has given norms only for SSR and PSSR. The corresponding values of SSR and PSSR given by him are about 50 and 35-40 respectively. The transition in classroom behaviour of teachers as well as of students is lower in the case of Indian classrooms, when compared to American classrooms. The higher SSR and TSSR may be due to consistent lecturing as indicated in the cell 5-5. Higher PSSR is due to the 8-8 cell which implies that pupils have been giving responses longer than three seconds. Again it may be due to the type of questions asked by the teachers.

Table 6 below summarises the various ratios discussed above along with the corresponding American norms given by Flanders (1970).

TABLE 6

Interaction Ratios in Indian and American Classrooms

No.	*Interaction Variable*	*Indian Class-rooms*	*American norms (approximate)*
1.	Percent Teacher Talk (PTT)	68	68
2.	Percent Pupil Talk (PPT)	19	20
3.	Silence or Confusion	13	11 or 12
4.	Teacher Response Ratio (TRR)	55.42	42
5.	Instantaneous Teacher Response Ratio (TRR 89)	74.97	60
6.	Teacher Question Ratio (TQR)	16.32	26
7.	Instantaneous Teacher Question Ratio (TQR 89)	50.27	44
8.	Pupil Initiation Ratio (PIR)	11	34
9.	Content Cross Ratio (CCR)	59	55
10.	Steady State Ratio (SSR)	63	50
11.	Teacher Steady State Ratio (TSSR)	69.3	Not available
12.	Pupil Steady State Ratio (PSSR)	47	35-40
13.	Miller Flexibility Ratio (MFR)	2.99	Not available

Microscopic View

Major classroom interaction patterns were presented in the earlier section. The individual cells in the 10 × 10 matrix also help in understanding the sequence of the behaviour recorded. This reveals the context in which a particular event was found to be occurring. Putting in another way, the cells provide information about what preceded and what followed a particular behaviour. In this section, some of the important sequences are identified and discussed from the master matrix.

Praise Pattern

In the classrooms observed, teachers used 47.0 percent praise during their talk. Mostly, small statements like ' good ', ' yes, yes ', ' um, hm ', ' right ', etc. might have been used, as the frequency of occurence is quite low in the steady state cell (2-2). Some of the praise, about 22 percent, is buried in teacher talk as revealed from cells in column 2 and row 1-7. A major portion of the praise, about 73 percent of the total praise, is after student talk as is evident from (cells 8-2 and 9-2). About 5 percent of the praise is after silence (cell 10-2) which implies that either the silence was praised as a part of discipline or prompting was done to bring out the students. Scrutiny of the row 2 in columns 1 to 7 reveals the antecedent of praise statements. It implies that after praise, teacher talk started. After praising, the teacher shifted to further questions (cell 2-4) or to lecturing (cell 2-5). Student response also followed praise (cells 2-8 and 2-9) which comes to about 33 percent of praise.

Questioning Pattern

Examining rows and column 4 reveals the questioning pattern—what follows or precedes teacher questions. About 55% of the time, teacher question is followed by student response and initiation (cells 4-8 and 4-9). The students also devote about 50% of the time to answers (cell 8-8). About 20% of the time is devoted to extended questions (cell 4-4). In some cases, the questions are also followed by silence

(cell 4-10). Most of the time, questions precede lecture, followed by student response, followed by silence or confusion. Cell 4-10 indicates occurrence of the time to think before answering the question. Frequency in the cell (4-5) is paradoxical. If the teacher proceeds to lecturing after questioning without any intermittent behaviour, it is felt that it should form a part of 5 itself.

Silence or Confusion

In the total transitions following silence, it is terminated by the teacher about 75% of the time while the students terminate it about 25% of the time. Most of the time, the teacher terminates silence by lecture and questions (cells 10-5 and 10-4). Silence or confusion occurs mostly after teacher lecturing (cell 5-10). This may be due to the fact that the teacher thinks before explaining. Silence or confusion is also preceded by teacher questions usually (cell 4-10) and pupil response (cell 8-10) or initiation (9-10). Teacher directions (cell 6-10) and teacher criticism (cell 7-10) precede silence occasionally. " Open your book at page——." The students start searching the page in the books. This may be a sequence to 6-10. " Let's prepare for a language game ". The students start preparation silently or there is a pause before the game starts, may be another case for such a sequence. The sequence (7-10) is clearly a case of concern for discipline in the classrooms through direct action. Here the teachers might have snubbed, criticised or used personal satire in the students.

Directions and Criticisms

There is comparatively a low use of criticism as is evident from the low frequencies in category 7. Within criticism, however, major portion is covered in steady state cell (7-7). Criticism has been used after silence or confusion (cell 10-7) most of the time. Directions have been mostly used before and after pupil response (cells 6-8 and 8-6).

Reconstructing the Image

Let's enter an Indian Classroom in a high school where a topic in Social Science or Humanity is being taught. What do you expect to encounter there? Eighty-seven percent of the chances are that you will encounter the classroom humming with someone talking, a teacher or a student. Mostly, you will find the teacher occupying the stage, as it is he, who rules the roost in the classroom. The students, you will discover, play second fiddle to him. The chances are weighted 3.5 times more in his favour as compared to students. The remaining thirteen percent of the time, you are likely to notice a kind of interruption due to silence or confusion.

Concentrate on what the teacher talks in the classroom. You will find that lecturing is the dominant pattern. Seventy-three percent of his total talking time is devoted to this activity. During lecturing, it is likely that for about sixty-three percent of the time, the activity is in extended, or what is technically known as 'steady' form. The next notable activity of the teacher you will stumble upon in the classroom is questioning where he spends about fourteen percent of his time. The nature of the responses from the students to the questions posed by the teachers reveals the type of the questions usually asked by the teacher. The teacher in the classroom puts narrow questions most of the time. The use of open type questions is miserably low. The usual pattern of asking questions is explanation, followed by questions, followed by pupil response, again followed by explanation. Quite often, the chances are that the pupil responses will be extended.

Let's probe the responsive dimension of the teacher talk. Out of 100 occasions, there are chances that the teacher will either praise, encourage, accept or use student's ideas with a view to motivating the students to participate in the classroom verbal transactions. But again, the low level of pupil initiated talk reveals that the student participation elicitated by the teacher is usually responsive in nature. In other words, the quality of participation on the part of the students is low. One reason, as mentioned above, may be the use of narrow questions. Despite the use of such verbal transactions, which usually encourage pupil participation and even initiation, the low pupil initiation may be attributed to the nature of praise which the verbal behaviour dominantly used implies that the praise statements must have been quite brief (' um, hm ', ' yes ', ' right ', good, ' yes, go on ', etc.). May be the praise has not been effectively taken up by the students. If the praise statements are preceded by only responsive type of pupil talk, naturally, this will be reinforced and students will be more likely to resort to this category of behaviour. However, pupil initiation statements precede teacher praise, this type of behaviour will be reinforced and there is a likelihood of its increase. At the same time, the praise statements with reasons for the same may be favoured. If it is given like " yes, it is quite good; you have hit upon a new idea.... ", the quality of pupil talk may improve.

How often is an Indian teacher directive? How often does he become harsh to the students? For about four to five percent of the time during his talk, the teacher issues directions for one purpose or the other. Mostly, teacher direction is followed by pupil response. For e.g., " Open your books at page——; Ram, will you please read? " There are chances, that direction is used for disciplinary purpose or sometimes, the class as a whole may show resistance to the directions resulting in confusion. The Indian teacher is likely to use punitive measures quite infrequently. Chances are only one in hundred.

What are we likely to encounter when neither teacher nor student is talking? Why pauses? About thirteen percent of the time account for such occasions. About half of the silence or confusion is extended. During the rest of the period under this activity, mostly, it is followed by teachers, lecturing. May be the teacher thinks a bit during the lecture to take up further explanation. May be some of his explanation has carried dissatisfaction in most of the students and all of them started shouting resulting in confusion. Pupil response is preceded by silence. This may be a thinking pause for him to respond.

By way of conclusion, the Indian classroom is marked by the dominant *Verbal Behaviour, Teacher Talk or Student Talk.* But the quality of *Teacher Talk* as well as *Pupil Talk* leaves much to be desired. The Indian teachers will have to use open questions more often and will have to reinforce pupil initiation more often than their responsive behaviour through positive activity, if pupil initiation is to be developed. This appears to be a vital need at the moment. The redeeming feature of the teacher behaviour in our classrooms, revealed by the study is that, they resort to negative affectivity to a very limited extent. But effects in terms of pupil behaviour, particularly with reference to their initiation behaviour, are quite meagre. Attempts will have to be made and suitable teacher behaviour strategies to be developed to this end.

Further Work

In view of what has been discussed in the preceding sections, it will be worthwhile to observe more classrooms in different states of India. The observational data should be accompanied by detailed information about the teacher, grades, subjects, topics and the instructional objectives attempted during the period of observation. May be the observers have to interview the teacher in addition to administering a questionnaire to collect relevant information after the observation. This will add more meaning to the data collected. If the resources permit, it will be quite useful to use multiple coding of classroom events with a modified version of the tool or with more than one tool. Undoubtedly, the area of classroom behaviour is the most important area of educational research. Neglecting it we perish and researching it we may redeem the profession by making it a scientific discipline, since the quality of classroom transactions will determine the quality of our future generation and so our future world.

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3

TEACHER CLASSROOM BEHAVIOUR IN RELATION TO NON-PERSONALITY VARIABLE

Background

In education, as in any other human enterprise, the same attention should be paid to considerations of quality as is paid to those of quantitative requirements. The country has witnessed an unprecedented expansion of education in the post-independence period to meet obligations of the constitutional provisions of universal primary education and consequent expansion at subsequent stages. In the process, educational facilities have multiplied manifold leading to the dilution of the quality of education.

The need for a constant endeavour to preserve and improve the quality of education is acknowledged by all concerned. The reports of various committees and commissions from time to time have underscored this aspect. During the last decade and a half, a number of steps have been taken to arrest the deteriorating quality of education, to consolidate and to improve it further following recommendations of the several expert bodies. Some of the programmes of educational improvement undertaken relate to the structural reorganisation of the educational system, improvement of the instructional facilities in educational institutions, improving academic and professional competence of the personnel, updating and upgrading curricula, preparation of the instructional materials, formulation and implementation of the developmental projects in educational institutions and development of educational research to help tone up educational policies and programmes. Still the problem of falling standards is disturbingly persistent calling for a fresh review of the efforts in this direction.

M. R. SANTHANAM

The programmes of qualitative improvement usually refer to the organization of schools and classes, improving and updating of the curricula and the process of teaching. of Most of the programmes of qualitative improvement, thus far, fall into the first two groups. The programmes in the area of process improvement are conspicuous by their absence. It appears to have been assumed that programmes in the former two will *ipso facto usher* in the desired process improvement. But reality is to the contrary.

The Need

In order to plan and implement effectively the programmes of process changes, classroom processes themselves need to be understood. In the classroom, it is the nature and efficacy of teaching that ultimately decides the returns on our educational investment. While the teacher training programmes have been placing heavy reliance upon the theories of learning, we have failed to appreciate the need for evolving theory of teaching. A thorough understanding of the complex behavioural phenomenon of teaching in the classroom is of immense significance in any scheme of qualitative improvement in the 'process'. There are evidences to show that the verbal behaviour of the teacher in the classroom occurring in a situation, to be characterised as group dynamics, has a decisive influence upon pupil learning and attitudes (Flanders, 1965).

The teaching-learning phenomenon occurs in the context of a social situation and hence what superficially appears to be a cognitive enterprise acquires a dimension of human relations in its operational stage. The degree of success or failure of the enterprise would depend upon the extent to which the leader of the group, the teacher, takes into account the emerging social-emotional climate in the classroom and acts accordingly. The social-emotional climate mainly depends upon the teacher behaviour, since in a classroom situation, it is the teacher who steers and guides the proceedings. The former is, thus, crucially conditioned by the type of teacher behaviour exhibited in the classroom.

Studies of classroom processes and teacher behaviour in the context of the emerging social-emotional climate may be considered in distinct groups. There are those which study the relationships between certain presage factors and specified dimensions of the process, while some others seek to link the process dimensions with product variables. Considerable research effort in this direction is being made abroad. In India, however, the work has started only recently. Santhanam, Quaraishi and Lulla (1970) and Buch and Santhanam (1971) found differences in the classroom behaviour of male and female teachers. Buch and Santhanam (1972) exploring teachers' ' initiation-response balance ' in different curricular subjects found a positive relationship between Tamil and History. Sustained efforts are needed to achieve a breakthrough in this vital area of research.

The Present Study

The present study is one in the group of studies undertaken by the Centre of Advanced Study in Education, Baroda. It attempts to study the relationships between teacher influence in classroom and some selected non-personality variables and the curricular subject taught. In addition to this, an attempt has also been made to identify salient classroom behaviour patterns. This study which was conducted in Gujarat and Madras falls in the area of ' presage-process ' research.

Objectives of the Study

The objectives of the study may be specifically stated as under :—

1. To study the relationship between teacher influence in the classroom and (a) age, (b) experience, (c) recency of training, (d) sex, (e) marital status and (f) subject taught by the teacher.
2. To identify salient features of the classroom behaviour patterns of the teachers observed during the study.

Hypotheses

The following hypotheses were formulated in accordance with the above objectives:—

1. Age of the teacher is significantly related to teacher influence in the classroom.
2. Experience of the teacher is significantly related to teacher influence in the classroom.
3. Recency of training is significantly related to teacher influence in the classroom.
4. There is no significant difference between the influence exerted in the classroom by male and female teachers.
5. There is no significant difference between the influence exerted in the classroom by married and unmarried teachers.
6. There is no significant difference between the influence exerted in the classroom by the teachers teaching different subjects.

Procedure

Sampling : The sample for the study was randomly drawn in two parts. The first part of the sample of 174 teachers, with random orientation towards subject taught, was drawn from the schools of Gujarat. This part of the sample was used for studying the non-personality variables with respect to the teacher influence.

The second part of the sample consisted of thirty-two teachers randomly drawn from schools in the city of Madras. All the teachers teaching all the six school subjects were selected for observation, to study the classroom interaction patterns vis-a-vis subjects taught.

Tools : Flanders Interaction Analysis Category System (FIACS) was used to observe the classroom behaviour of teachers. The tool, procedure of observation, analyses and interpretation of data appear in Chapter II. Information about the teacher was collected through a questionnaire.

Data Collection : Before data collection, observers were duly trained in observation and inter-observer reliability of 0.85 after Scott's coefficient was achieved. Each of the teachers was observed for one hour in two sessions. Observation was accompanied by administration of the questionnaire to the teachers to collect data about non-personality variables and the curricular subject taught by them.

Statistical Analysis : Partial correlations were worked out to study the relationships between the non-personality variables of the teachers and influence exerted by them in the classrooms. Two-way analysis of variance was used to test hypotheses (4) and (5) relating to sex and marital status of the teachers. To test the last hypothesis two-way analysis of variance followed by ' t ' test was applied.

Results and Discussion

Age, Recency of Training and Experience :

In order to determine the relationship between the criterion variable (I/D and i/d ratios) and age, recency of training and experience of the teacher, the technique of partial correlation was applied. The relationships between the criterion and each one of the independent variables were studied after eliminating the effects of the remaining two independent variables. The results have been summarised in Tables 1 and 2.

TABLE 1

Relationships between I/D and Age, Experience and Recency of Training

Variables	*Correlation*	*Partial correlation*	*Significance*
I/D—Age	$r_{12} = -.01$	$r_{12\cdot 34} = -.01394$	Not significant
I/D—Recency of Training	$r_{13} = -.04$	$r_{13\cdot 24} = .06454$	Not significant
I/D—Experience	$r_{14} = -.0$	$r_{14\cdot 23} = -.04117$	Not significant

TABLE 2

Relationships between i/d and Age, Experience and Recency of Training

Variables	*Correlation*	*Partial correlation*	*Significance*
i/d—Age	$r_{12} = -.05$	$r_{12 \cdot 34} = -.02538$	Not significant
i/d—Recency of training	$r_{13} = -.06$	$r_{13 \cdot 24} = -.00479$	Not significant
i/d—Experience	$r_{14} = -.09$	$r_{14 \cdot 23} = .07321$	Not significant

It is evident from Tables 1 and 2 that the variables of age, experience and recency of training are not significantly related to any of the measures of teacher influence (I/D and i/d).

Sex and Marital Status :

Two-way analysis of variance was employed to study the relationships between teacher influence and sex and marital status of teachers. Tables 3 and 4 give the results.

TABLE 3

Summary of Analysis of Variance on I/D vis-a-vis Sex and Marital Status of Teachers

Source of Variation	*SS*	*df*	*MS*	*F*	*Significance*
A Sex	.05231	1	.05231	2.04176	Not significant
B Marital Status	.00227	1	.00227	0.0886	Not significant
AB Sex × Marital Status	.05166	1	.05166	2.01639	Not significant
Error Variance	4.35622	170	.02562		

The Main Effects : In respect of the I/D ratio, one index of the teacher influence in classroom including content emphasis, all the three ' F ' ratios turned out to be non-significant.

This implies that the two I/D means for male and female teachers, averaged over marital and non-marital status do not differ significantly. Similarly, the two I/D means of married and unmarried teachers averaged over both males and females do not differ significantly.

The Interaction Effects : The fact that the F-ratio for the interaction between the sex and marital status of teachers is not significant indicates that the difference between the means of male and female teachers in the married group is not significantly different from the difference between the means of male and female teachers in the unmarried group. With a non-significant interaction effect between A and B (sex and marital status) we may say that the A (sex) effect i.e., the difference between the males and females, is independent of the effect of B (marital status). We have approximately the same difference between the means of males and females regardless of their marital status. Alternatively, we can say that the B (marital status) effect, i.e., the difference between the means of married and unmarried teachers, is independent of the effect of A (sex). We have approximately the same difference between the means of married and unmarried teachers regardless of their sex.

In a similar manner, 2 × 2 analysis of variance was applied to the i/d's. The results are presented in Table 4.

TABLE 4

Summary of Analysis of Variance on i/d vis-a-vis Sex and Marital Status of Teachers

Source of Variation	*SS*	*df*	*MS*	*F*	*Significance*
A Sex	.21160	1	.21160	4.06376	P<.05
B Marital Status	.40833	1	.40833	7.84194	P<.01
AB Sex × Marital Status	.02782	1	.02782	0.53428	Not significant
Error Variance	8.85301	170	.05207		

The Main Effects : In respect of i/d, which is another index of the teacher influence in the classroom, excluding content emphasis, the two main effects, the one of sex and the other of marital status, turned out to be significant.

F-ratio, in respect of A (sex), is significant at .05 level. This implies that the means for males and females, averaged over the levels of B (marital status), differ significantly. Examination of the means show that males on an average, exert more indirect influence (.59) than females (.55). F-ratio in respect of B (marital status)is significant at .01 level of significance. This implies that the means for married and unmarried teachers, averaged over the levels of A (male and female groups of teachers), differ significantly. In other words, the means show that the unmarried teachers are, on an average, more indirect in their influence than married teachers (.55).

The Interaction Effects : The interaction effect between A and B (between sex and marital status) is not significant as borne out by a non-significant ' F '. The fact that the ' F ' is not significant, indicates that the difference between the means of male and female teachers in the married group is not significantly different from the difference between the means of males and females in the unmarried teacher group. So with a non-significant A × B i.e., sex and marital status interaction, we can say that the effect of A (sex), i.e., the difference between the means of males and females, is independent of B (marital status) i.e., we have approximately the same difference between the means of males and females regardless of their marital status. Alternatively, we can say that the effect of B (marital status) i.e., the difference between the means of married and unmarried teachers, is independent of A (sex) or we have approximately the same difference between the means of married and unmarried teachers, regardless of their sex.

Subjects Taught :

Since thirty-two teachers in the second part of the sample were observed in respect of each one of the six subjects, six I/D and six i/d ratios were obtained for the six different subjects. Two-way analysis of variance was applied to the data. The results are reported in Tables 5 and 6.

TABLE 5

Summary of the Analysis of Variance for I/D's in Six Different Subjects

Source of Variation	*SS*	*df*	*MS*	*F Ratio*	*Significance*
Between Subjects	0.2714	5	0.05428	9.07692	P<.01
Between Teachers	2.19066	31	0.07066	11.81605	P<.01
Within Groups	0.92804	155	0.00598		

Between the subjects and between the teachers the values of 'F' in Table 5 indicate that the difference in I/D's in both the cases are significant at .01 level. This calls for further analysis to find out what are the subject pairs which yield significant differences. To this end, all the possible fifteen pairs of six subjects under study were subjected to student's t-test. The results are given in Table 6.

TABLE 6

T-values for I/D's and Different Subject Pairs

Subject Pairs	$Mean_D$	SD_D	SE_{M_D}	'*t*'	*Significance*
Tamil—English	.06	.11	.01944	3.08641	P<.01
Tamil—Mathematics	.06	.11	.01944	3.08641	P<.01
Tamil—History	.04	.08	.01414	2.82885	P<.01
Tamil—Geography	.02	.08	.01414	1.41442	Not significant

TABLE 6 (Contd.)

Subject Pairs	*Mean* $_D$	*SD* $_D$	*SE* $_{M_D}$	*'t'*	*Significance*
Tamil—Science	.02	.09	.0159	1.25786	Not significant
English—Mathematics	0				—
English—History	.10	.12	.02121	4.71475	P<.001
English—Geography	.08	.13	.02298	3.48128	P<.01
English—Science	.04	.11	.01944	2.05761	P<.05
Mathematics—History	.10	.12	.02121	4.71475	P<.001
Mathematics—Geography	.08	.11	.01944	4.11522	P<.001
Mathematics—Science	.05	.12	.02121	2.35737	P<.05
History—Geography	.02	.03	.0053	3.77358	P<.001
History—Science	.06	.1	.01767	3.39558	P<.01
Geography—Science	.04	.09	.0159	2.51572	P<.05

The individual 't' tests carried out in respect of the fifteen subject pairs yielded as many as twelve significant 't' results, the significance level ranging from .001 to .05. The three pairs which did not show significant differences are Tamil—Geography, Tamil—Science and English—Mathematics.

As in the case I/D, analysis was carried out on i/d's. Tables 7 and 8 present the results.

TABLE 7

Summary of the Analysis of Variance for i/d's in Six Different Subjects

Source of Variation	*SS*	*df*	*MS*	*F Ratio*	*Significance*
Between Subjects	0.27807	5	0.05561	4.00359	$P<.01$
Between Teachers	3.92624	31	0.12665	9.11807	$P<.01$
Within Groups	2.15363	155	0.01389		

The above table indicates the same results for i/d as was obtained in the case of I/D.

For further analysis, student's 't'-test was applied to the data. The results are shown in Table 8.

TABLE 8

t-values for i/d's and Different Subject Pairs

Subject Pair	$Mean_D$	SD_D	SE_{M_D}	'*t*'	*Significance*
Tamil—English	.024	.158	.02792	.85959	Not significant
Tamil—Mathematics	.085	.15	.02651	3.20633	$P<.01$
Tamil—History	.01	.16	.02828	.3536	Not significant
Tamil—Geography	.05	.19	.03358	1.48898	Not significant

TABLE 8 (Contd.)

Subject Pairs	$Mean_D$	SD_D	SE_{M_D}	'*t*'	*Significance*
Tamil—Science	.01	.17	.03005	.33277	Not significant
English—Mathematics	.10	.19	.03358	2.97796	$P<.01$
English—History	.01	.15	.02651	.37721	Not significant
English—Geography	.07	.15	.02651	2.64051	$P<.05$
English—Science	.01	.16	.02828	.3536	Not significant
Mathematics—History	.09	.19	.03358	2.68016	$P<.05$
Mathematics—Geography	.02	.17	.03005	.66555	Not significant
Mathematics—Science	.08	.18	.03181	2.51493	$P<.05$
History—Geography	.05	.15	.02651	1.88608	$P<.10$
History—Science	.01	.13	.02298	.43516	Not significant
Geography—Science	.08	.17	.03005	2.66222	$P<.05$

The individual 't' tests carried out on the fifteen possible pairs, yielded only seven significant 't' ratios as compared to twelve in the case of I/D. The pairs showing no significant differences are Tamil-English, Tamil-History, Tamil-Geography, English-History, Mathematics-Geography and History-Science. The number of ratios which are not significant increased in the case of i/d, probably due to less content orientation of the ratio itself.

Matrix Comparison—Male and Female Teachers

On applying Darwin's likelihood ratio criterion to the master matrices representing 107 male teachers and sixty-seven female teachers, the value of z turned out to be 35.211 which is significant at .01 level of significance. The significant features of classroom behaviour of teachers emerging from the matrices are described below:

1. Female teachers, on the whole, have generated a greater amount of interaction than male teachers, in a given time, as revealed by greater per hour teacher interaction.
2. Male teachers have talked more (66%) than female teachers (62%).
3. Student talk has been more in classes under female teachers (24%) than in those under male teachers (20%)
4. The T/S Ratio has been found to be 3.34 for male teachers and 2.52 for female teachers which supplements the finding at (2) above.
5. Flexibility of communication has been slightly more in classes under male teachers (SSR = 60%) than under female teachers (SSR = 62%).
6. Female teachers have shown slightly greater flexibility of communication (lesser TSSR of 64.7%) than male teachers (greater TSSR of 65.0%).
7. Classroom communication in classes under female teachers has been slightly more interrupted with spells of silence or confusion (14.27%) than in the case of male teachers (14.06%).
8. Female teachers have higher I/D ratio (0.26) than male teachers (0.24).

9. Male teachers have a greater i/d ratio (0.61) than female teachers (0.57).
10. Teacher responsiveness has been higher in the case of male (TRR=62%) than female teachers (TRR=57%).
11. Female teachers have used questions as initiation more (TQR = 21%) than male teachers (TQR = 18%).
12. On the question of instantaneous teacher response ratio both the sexes have scored alike (TRR 89 = 76%).
13. Female teachers have used more instantaneous (at the cessation of pupil talk) questions (TQR 89 = 67%) than male teachers (TQR 89 = 55%).
14. Male teachers have used categories 1, 2 and 3 to constructively integrate them with classroom communication fabric more (23.4%) than female teachers (20.7%).
15. Male teachers have put more emphasis (56%) on content than female teachers (52%).
16. Female teachers have used praise, encouragement in less measure (3.0%) as compared to male teachers (3.4%). Female teachers, however, have used more praise in immediate retention to pupils (73.1%) than male teachers (59.4%).
17. Female teachers have used praise for prompting pupil talk in greater measure (41%) when compared to male teachers (27.2%).
18. Mutual transition between categories 2 and 8 (8-2 and 2-8) have occurred more often in the case of female teachers (67.5% and 36.9% respectively) than male teachers (52.7% and 23.4% respectively), indicating a higher level of student responsive talk, kept up deliberately by female teachers through praise.
19. Male teachers have switched on to information delivery from offering praise to pupils, in a greater measure (16.9%) than female teachers (10.1%).

20. A larger segment of teacher talk has been utilized by way of total immediate reaction to student talk by female teachers (16.0%) than by male teachers (13.2%).
21. Female teachers have used questions in the context of students' responsive talk to a greater extent (4.8%). than male teachers (2.8%).
22. Content delivery following students' self-initiated talk has been more (1.2%) in the case of male teachers than with female teachers (0.9%).
23. Female teachers have resorted to orders and criticism to students' self-initiated talk to a greater extent (0.5%) than male teachers (0.4%).
24. Pupils have initiated more in classes under male teachers (18%) than in those under female teachers (13%).
25. Pupils under female teachers have used more steady and sustained talk (PSSR = 53%) than the pupils under male teachers (PSSR = 47%).
26. More pupil talk has occurred in the context of teacher talk, under male teachers (45%) than under female teachers (40%).
27. Self-initiated talk of pupils in the context of teacher talk has been more in the case of male teachers (9%) than female teachers (6%).
28. Pupils' responsive talk has been found to be more in the case of female teachers (87.3%) than in the case of male teachers (81.8%).
29. Responsive talk of pupils has been more in the context of teacher directions under male teachers (4.8%) than female teachers (3.6%).
30. Questions from male teachers have produced pupils' self-initiated talk to the extent of 4.2 per cent, while the female teachers could do so only to the extent of 3.3 per cent.
31. Pupils' initiated talk following silence/confusion has been more under male teachers (1.8%) than under female teachers (1.0%).

32. Pupils' responsive talk followed by silence/confusion has been more under male teachers (5.2%) than in the case of female teachers (3.7%).

33. Pupils' self-initiated talk followed by silence/confusion has been more under male teachers (1.5%) than under female teachers (1.0%).

34. More silence has occurred following teacher talk under male teachers (33.6%) than under female teachers (28.1%).

35. Sustained silence has occurred more in classes under female teachers (63%) than in those under male teachers (57%).

Matrix Comparisons—Married and Unmarried Teachers

In a similar manner, the application of Darwin's technique to the master matrices relating to 140 married teachers and 34 unmarried teachers, yielded a *z* value of 42.741 which is significant at .01 level of significance. The salient features of the interaction pattern based on marital status are given below:—

1. Unmarried teachers have talked slightly more (65%) than married teachers (64.1%).
2. Incidence of silence/confusion has been more in classes of married teachers (14.3%) than in those of unmarried teachers (13.3%).
3. Unmarried teachers' talk in relation to pupils' talk (T/S ratio) has been more (2.99) than in the case of married teachers (2.96).
4. Flexibility of communication has been more in the classes of unmarried teachers (SSR = 59%) than in those of married teachers (SSR = 61.4%).
5. Unmarried teachers have achieved slightly higher I/D ratio (0.27) than married teachers (0.24).
6. Unmarried teachers have achieved higher i/d ratio (0.66) than married teachers (0.58).

7. Unmarried teachers have responded more (66.8%) than married teachers (58.1%).
8. Unmarried teachers have asked questions more often (20.8%) than married teachers (18.7%).
9. Unmarried teachers have instantaneously responded more often (TRR 89 = 80.4%) than married teachers (TRR 89 = 74.9%).
10. Unmarried teachers have used instantaneous questions more (TQR 89 = 64.3%) than married teachers (TQR 89 = 59.4%).
11. Married teachers have used a greater segment (22.22%) of the combined use of categories 1, 2 and 3 for constructive integration than unmarried teachers (22.12%).
12. Married teachers have resorted to a more (25.44%) vicious circle component, with reference to total use of categories 6 and 7 than in the case of unmarried teachers (19.63%).
13. Flexibility, particularly in teacher talk, in respect of unmarried teachers has been more (TSSR = 63.9%) than in the case of married teachers (TSSR = 66.1%).
14. Emphasis on content has been more in the case of unmarried teachers (55.27%) than in the case of married teachers (54.44%).
15. On the whole, unmarried teachers have used praise/encouragement slightly more (3.32%) than married teachers (3.25%).
16. Unmarried teachers have used praise more (71.60%) in direct reaction to student talk than married teachers (62.85%).
17. Unmarried teachers have used more (63.97%) praise in the context of pupils' responsive talk than married teachers (56.93%).
18. Again it is unmarried teachers who have used more (7.62%) praise in direct reaction to students' initiated talk than married teachers (5.92%).

19. Initiations from pupils have been slightly more in the case of married teachers (15.8 %) than in the case of unmarried teachers (15.4 %).
20. Flexibility of communication in pupil talk has been more in the case of pupils under unmarried teachers (PSSR = 45.4 %) than pupils under married teachers (PSSR = 50.6 %).
21. Pupils' initiated talk following teacher questions also has been more in the case of unmarried teachers (4.5 %) than in the case of married teachers (3.6 %).
22. Silence/confusion following teacher talk has been more in the case of unmarried teachers (33.9 %) than in the case of unmarried teachers (30.4 %).

Matrix Comparisons—Subjects Taught

Likewise, again, the Darwin's criterion test was applied to all the fifteen pairs of subjects obviously for testing the significance of differences in the sequential distribution in the matrices. All the pairs indicated significant differences at .01 level of confidence. Hence the six master matrices representing the six subjects were scrutinized for important aspects of teacher significance patterns. The main findings are given below:

1. Teachers have talked most in History (66.6 %) and least in English (58.6 %).
2. Pupil talk has been the highest in English (27.8 %) and the lowest in Mathematics (19.7 %).
3. Incidence of silence/confusion is the highest in Mathematics (15.7 %) and the lowest in History (10.5 %).
4. Teacher talk in relation to student talk i.e., T/S ratio, is is the highest in Mathematics (3.28) and the lowest in English (2.10).
5. The highest I/D ratio is in the case of Mathematics (0.35) and the lowest in History (0.24).
6. History has the highest i/d ratio (0.62) while Mathematics has the lowest (0.51).

7. Teachers have been responding most often in English (62.2%) and least often in Mathematics (51.8%).
8. Teacher questioning has been the highest in Mathematics (29.3%) and the lowest in History (15.4%)
9. The most frequent instantaneous teacher response is evinced in English classes (79.7%) while the least is evinced in Geography (73.5%).
10. Teachers' instantaneous questioning behaviour has been the highest in Mathematics (47.3%) and the lowest in English (33.2%).
11. Teachers used the highest of the total use of categories 1, 2 and 3 as constructive integration in History (19.38%) and the lowest in English (9.37%).
12. Teachers have used categories 6 and 7 the most in Mathematics (24.51%) and the least in English (14.59%).
13. Teacher talk has been more flexible in Mathematics (TSSR = 39.31%) while it has been the least flexible in History (TSSR = 58.72%).
14. Emphasis on content has been the heaviest in History (53.27%) and the slightest in English (41.07%).
15. Use of praise has been the highest in English classes (9.96%) and the lowest in History (5.92%).
16. Teachers have been using praise in immediate reaction to pupil talk most often in Geography (82.0%) and least often in Science (74.72%).
17. Use of praise following pupils' responsive talk has been the highest in English (77.86%) and the lowest in Science (65.01%).
18. Praise serving as the immediate context for pupils' responsive talk has been the highest in English (56.61%) and the lowest in Mathematics (24.43%).
19. Use of praise following pupils' initiated talk has been the highest in Science (9.70%) and the lowest in English (4.16%).

20. Teachers put questions immediately after pupils' responsive talk, most often in Mathematics (14.83%). and least often in Science (4.42%).
21. Pupils' initiation has been occuring most often in Mathematics (23.01%) and least often in English (9.26%).
22. Pupil steady state ratio has been the highest in History (42.66%) and the lowest in Mathematics (7.31%).
23. Pupils' initiated talk is most often in Mathematics (23.01%) and least often in English (9.26%).

Conclusions

The study attempted to find out the relationship between the teacher influence in the classroom and such variables as age, sex, marital status, experience, recency of training and the subject taught by the teacher. The study revealed no significant differences between I/D and i/d, the two indices representing teacher influence in the classroom, age and recency of training. Sex and marital status of teachers were found to be not significantly related to I/D. They were, however, significantly related to i/d where content emphasis is excluded. The teacher influence patterns differed significantly during the course of teaching different subjects.

It will be worthwhile to undertake differentiated studies to answer such questions emerging from the present study as: Are the inter-subject differences the real differences? Are they due to subject variability or due to the particular topic that was being taught at the time of observation or due to the particular instructional objective that was being attempted in the classroom? Will the results be consistent with increased number of classroom observations? Will they be consistent across objectives? The answer to the last two questions is yes. The validity of inter-subject variations in classroom behaviour patterns may be achieved to a limited extent. In more differentiated studies, the effect of the different types of influence patterns on the achievement of different instructional objectives by different types of pupils, may be attempted. Considerable work of quality, is needed to answer the questions posed above.

M. R. SANTHANAM

4

TEACHER CLASSROOM BEHAVIOUR WITH REFERENCE TO TEACHER PERSONALITY VARIABLES

Introduction

'The destiny of India is being shaped in her classrooms' (Education Commission 1964-66). This is not mere rhetoric. In a world based on science and technology, education determines the level of well-being, prosperity and security of the people. On the quality and number of persons coming out of schools and colleges, will depend our success in the noble enterprise of national reconstruction, with the ultimate objective of improving the masses. No reform, therefore, is more significant than to transform education so as to relate it to the life, needs, and aspirations of the people; thus, making it a powerful instrument of social, economic and cultural transformation necessary for the realization of our national goals. How can this be best achieved?

There is a growing consciousness in public and professional circles that the "goodness" of an educational programme depends, to a large extent, on the quality of teaching done in the classrooms (Ryans, 1960). The identification of qualified and able teacher personnel, therefore, constitutes one of the most important of all educational concerns. Producing capable teachers is another intrinsic interest and obligation of education. If competent teachers can be obtained, the likelihood of attaining desirable educational outcomes is substantial. On the other hand, misfit or indifferent teachers will render all the sumptuous equipment, elaborate and up-to-date curriculum ineffective. The study of how to identify and prepare effective teachers, in the context of classroom teaching, therefore, is imperative.

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What is Teaching?

A generic definition of teaching has been offered by Smith (1961)—"Teaching is a system of actions intended to induce learning." A Committee of the American Educational Research (Bellack, 1963) defines teaching as a "form of interpersonal influence aimed at changing the behaviour potential of another person." According to Amidon and Hunter (1966), teaching is "an interactive process, primarily involving classroom talk and occurs during certain definable activities e.g., motivating, planning, etc." According to Flanders (1970), "teaching behaviour exists in a context of social interaction. The acts of teaching lead to reciprocal contacts between the teacher and the pupils and the interchange itself is called teaching." Hughes Marie (1963) defines teaching as "interaction used in its dictionary sense of mutual or reciprocal action or influence." Stolurow and Pahel (1963) state that ".... teaching is fundamentally a social process involving communication and interaction between at least two people, a teacher and a student."

Teacher Behaviour—The Focus of Teaching

These definitions point out that teaching is an interactive process generated from teacher's and students' behaviour in terms of reciprocal contacts. Since teaching consists of teacher behaviour, we must observe teacher's behaviour in the classroom and identify effective patterns related to student achievement. If we can pinpoint the teacher properties associated with teacher behaviour and can identify, discriminate, and distinguish effective and ineffective patterns of teacher behaviour, we can plan effective programmes to change and modify teacher behaviour in the desired direction. The attempts may lead to effective theory or theories of instruction.

Studies on Teacher Behaviour—A Peep into the past

The earlier attempts to measure classroom behaviour date back to 1914, when Horn (1914) devised a procedure to measure pupil participation in the classroom. Pucket (1928) elaborated Horn's procedure and Wrightstone (1934) developed a scheme similar to that of Horn. In 1929, Barr reported a study identifying the behaviour patterns of effective and ineffective teachers. This was followed by a similar type of work by Jayne (1945) and Morsh (1956). Anderson and Brewer (1945, 1946), Anderson and others (1946) identified "dominative" and "integrative" patterns of teacher behaviour. Withall (1949) developed Social-Emotional Climate Index, which measured seven behavioural dimensions of a teacher. Since then, a large number of observational techniques to record teacher's behaviour have appeared. Simon and Boyer (1968) have compiled useful anthology of the classroom observation systems.

Teacher Behaviour and its Relation to Personality

Once the tools to record classroom behaviour of teachers were developed, researchers initiated studies correlating teacher behaviour with personality and other variables. Davies (1961) correlated teacher behaviour with certain personality traits. She found only one or two measures among twenty-five teacher traits significantly related to patterns of teaching observed with Flanders categories. For instance, teachers' scores on the sub-scales of "Warmth" from the Cattell 16PF tests and the total Minnesota Teacher Attitude Inventory (MTAI) scores were associated with responsive teacher behaviour as indicated by low positive but significant correlations.

Ringness (1964) compared similar observation scores of teacher behaviour of twenty-seven first-year teachers with measures of self-concept as teachers, measures of security and measures of anxiety. Although there were significant relationships among self-perception scores, the measures were not significantly associated with observed overt behaviour while teaching. Bowie (1957) found that the teacher's verbal behaviour in classroom was influenced by his value patterns as identified by the Allport-Vernon-Lindzey Study of Values. She categorized the teacher's verbal behaviour in terms of role-taking processes (feeling tone) and ideational content (ideas expressed) which implied a theoretical structuring of teaching. Ravitz (1958) found support for his hypothesis that teachers' verbal behaviour reflected their concern for self or for students as identified by semantic differential inventory.

Travers and others (1961), utilizing two large samples of elementary teachers, attempted to relate teacher needs with teacher behaviour. The four dimensions of needs (achievement, affiliation, recognition, and control) as identified by a projective instrument appeared to be not significantly related to the overt behaviour of teachers observed by Withall's technique. The scores on teachers' 'need to control', as measured by a paper and pencil test and Teacher Preference Schedule, were significantly related to teacher controlling behaviour in the classroom.

Bowers and Soar (1961) attempted to correlate patterns of observed teacher behaviour as indicated by OScAR with teacher personality measured by the Minnesota Multiphasic Personality Inventory (MMPI). They found the highest relationships between the psychopathic deviate (pd), schizophrenic (Sc), and hysteria (Hy) scales of the MMPI and the OScAR dimensions of emotional climate, verbal emphasis, and social structure. Bowers and Soar (1961) concluded that teachers who (a) lacked maturity, depth of effect and ability to feel personal loyalties (high Pd), and (b) were constrained, cold, remote and inaccessible (high Sc), were less likely to have supportive emotional climates, extensive pupil interaction or any great amount of pupil group work in their classrooms.

Wilk and Edson (1962, 1963), in their attempt to relate predictor variables, such as scores on the MTAI, MMPI, and Miller Analogies Test and Counsellor's judgments based on interviews with teacher behaviour of thirty prospective student teachers found high relationship between high MTAI scores and 'integrative' teacher behaviour as measured by the Flanders system and OScAR. They could not find a high relationship between MTAI scores and 'dominative' student teacher influence. They also found that counsellors were not able to identify students on the basis of an interview and admission data, who later exhibited integrative student teaching behaviour.

Levin, Hilton, and Leiderman (1957) reported a study conducted by Stuart in which the F-Scale was related to teacher behaviour in the classroom. Sheldon, Coale, and Copple (1959) found a significant relationship between scores on the " warm teacher scales " and scores on the F-Scale. Subjects scoring high on the " warm teacher scales " were found to be lower in " authoritarianism ". McGee (1955) obtained a correlation coefficient of .58 between underlying authoritarian trends of teachers' personality (measured by F-Scale) and their expressed authoritarian behaviour in the classroom (measured by observation record).

The Present Inquiry

Teacher behaviour may be studied at different levels, depending upon the purpose to be served by the inquiry (Meux and Smith, 1964). Perhaps the most elementary form of inquiry is what may be called " natural history ". Another form of investigation is to make an effort to discover the correlates of a given phenomenon. Inquiries of this kind are usually referred to as correlational studies—studies requiring no deliberate variation of conditions. At the third level of analysis, determinants of teacher behaviour become the objectives of inquiry. Rigorous studies at this level proceed by hypothetico-deductive methods—wherein definitions and postulates become the logical bases of the hypotheses to be tested experimentally.

The problem of the present research is a study of the first and second levels of inquiry mentioned above, wherein teacher behaviour is identified and correlated with personality traits and attitudes of the teacher. Prediction of teacher behaviour on the basis of these variables has also been made.

Before going into the details of the problem, it will be helpful to define the terms that are used in the present study.

Personality Trait : " A trait is a learned tendency of an individual to react as he has reacted more or less successfully in the past in similar situations when similarly motivated (McClelland, 1951). " Trait psychology endeavours to explain recurrent responses and consistencies in behaviour. In terms of this definition a trait is a function of heredity, learning, similar situations, and similar motivation.

Attitude : There are several popular definitions given by different social scientists of the term ' attitude '. One definition is that ' an attitude is a tendency to act ' (Faris, 1928). Baldwin (1901-1905) defines it as ' readiness for attention or action. ' Remmers and his associates (1960) define it as ' feeling for or against something. ' According to Thurstone (1946), ' an attitude is a degree of positive or negative affect associated with some psychological object. ' By psychological object, he means any issue under study such as school, church, system of education, etc. The definition accepted for the present work is the last one given by Thurstone.

Teacher Behaviour : Flanders (1970) defines teacher behaviour as ' those acts of the teacher, which occur in the context of classroom interaction.' The present study conforms to this concept of teacher behaviour. As teacher behaviour directly affects student behaviour and brings a change, Flanders calls it ' teacher influence ' and therefore he has mentioned indirect and direct influences in his category system. Direct influence of the teacher restricts the freedom of action of the students to take part in teaching-learning process, while indirect influence increases freedom of action in teaching-learning process. We have taken measures of teacher behaviour in terms of I/D and i/d ratios. I/D ratio indicates the proportion of indirect behaviour to direct behaviour including content emphasis, whereas i/d ratio is content free and reflects affective behaviour only.

In the present investigation, teacher behaviour (I/D and i/d ratios) was considered as a dependent variable and personality traits and attitudes as independent variables. In all. there are fifteen independent variables—seven personality traits and eight attitude measures. The personality traits are : (1) Active; (2) Vigorous; (3) Impulsive; (4) Dominant; (5) Stable (emotionally); (6) Sociable; and (7) Reflective. The attitudes that are included in the study are towards (1) Management; (2) Parents; (3) Other teachers; (4) Democratic Administrative Procedures; (5) Pupils; (6) Democratic Classroom Procedures; (7) Teaching Profession; and (8) Education.

Hypotheses

Keeping in view the objectives of the investigation, following null hypotheses were formulated :

There is no significant relationship between teacher behaviour (I/D and i/d) and

(i) " Active " trait of teacher's personality.
(ii) " Vigorous " trait of teacher's personality.
(iii) " Impulsive " trait of teacher's personality.
(iv) " Dominant " trait of teacher's personality.
(v) " Stable (emotionally) " trait of teacher's personality.
(vi) " Sociable " trait of teacher's personality.
(vii) " Reflective " trait of teacher's personality.
(viii) Teacher's attitude towards " Management ".
(ix) Teacher's attitude towards pupils' " Parents ".
(x) Teacher's attitude towards " Other Teachers ".
(xi) Teacher's attitude towards " Democratic Administrative Procedures ".
(xii) Teacher's attitude towards " Pupils ".
(xiii) Teacher's attitude towards " Democratic Classroom Procedures ".
(xiv) Teacher's attitude towards " Teaching Profession ".
(xv) Teacher's attitude towards " Education ".

In addition to testing the above hypotheses, the study also aimed at studying to what extent all the fifteen independent variables, taken together, help in predicting I/D and i/d ratios.

Procedure

Sample : The sample consisted of 200 teachers, drawn from twenty-one secondary schools. Eighteen schools were from Baroda city proper, two were from Ahmedabad and one was from Nadiad. Of the twenty-one schools, four were boys' schools, six girls' schools and eleven mixed schools. One hundred and twenty teachers were male and eighty female. The distribution of teachers according to school and sex is presented in Table 1.

TABLE 1

Schoolwise and Sexwise Distribution of Teachers

Types of schools	*No. of schools selected*	*Male Teachers*	*Female Teachers*
Boys' schools	4	32	4
Girls' schools	6	27	52
Mixed schools	11	61	24
Total :	21	120	80

The break-up of the sample according to subjects handled shows that fifty-eight teachers observed were handling English, fifty-three Social-Studies, thirty-three Science, twenty Gujarati, fifteen Hindi, fifteen Mathematics, and six Sanskrit. Thus seventy-two percent of the sample comprised English, Social Studies, and Science teachers. The remaining twentyeight percent comprised Hindi, Gujarati, Mathematics, and Sanskrit teachers. Table 2 shows the number and percentage of teachers teaching various subjects.

TABLE 2

Subjectwise Distribution of Teachers

Subjects	*Number of Teachers*	*Percentage*
English	58	29.0
Social-Studies	53	26.5
Science	33	16.5
Gujarati	20	10.0
Hindi	15	7.5
Mathematics	15	7.5
Sanskrit	6	3.0
Total :	200	100.0

Bio-data of every teacher was collected before he was observed. Table 3 shows the range, mean, median and SD of age, total experience, pre-training experience and post-training experience of teachers.

TABLE 3

Distribution of Bio-data of Teachers

	Range	*Mean*	*Median*	*SD*
Age	22-62	38.78	38.60	8.35
Total experience	0-40	14.14	13.24	8.23
Pre-training experience	0-21	3.75	2.65	3.75
Post-training experience	0-35	10.31	9.34	7.08

With respect to academic qualifications, it was found that majority of teachers (40.5 percent) possessed the degree of

Bachelor of Arts, 21.50 percent of the teachers had the degree of Master of Arts and the same percent of the teachers had the degree of Bachelor of Science. Only 0.50 percent teachers had degree of Master of Science while nine percent teachers under study had Matriculation certificate as their academic qualification. Regarding professional qualification, the bio-data revealed that the majority of the teachers (sixty-four percent) had Bachelor's degree in Education as their professional qualification, about 6.50 percent had the degree of Master of Education while 8.50 percent had Diploma in Education. Fifteen percent of the teachers possessed Secondary Teachers Certificate and Hindi Shikshak Sanad as their professional qualifications. The details are given in Tables 4 and 5.

TABLE 4

Distribution of Teachers According to Their Academic Qualifications

	S.S.C.	*B.A.*	*M.A.*	*B.Sc.*	*M.Sc.*	*Any Other*	*Total*
No. of teachers	18	81	43	43	1	14	200
Percentage	9.00	40.50	21.50	21.50	0.50	7.00	100.00

TABLE 5

Distribution of Teachers According to Their Professional Qualifications

	B.Ed.	*M.Ed.*	*T.D.*	*S.T.C. & H.S.S.*	*Any Other*	*Total*
No. of teachers	128	13	17	30	12	200
Percentage	64.00	6.50	8.50	15.00	6.00	100.00

Information regarding the methods courses offered by the teachers during their professional training was also collected. It was found that 23.50 percent had studied Gujarati and Social Studies as their special methods of teaching, while 21.50 percent had studied Mathematics and Science. About 8.50 percent of the teachers had studied English and Gujarati as their special methods of teaching. The subjects of English and Social Studies had been studied by 8.00 percent. History and Geography had been studied as special methods by 4.5 percent, and the same percentage of teachers had chosen Hindi and Gujarati. Two percent of teachers had offered Gujarati and Sanskrit, English and Mathematics, and Hindi and Geography as their special methods of teaching, while only one percent of them had offered Science and Social Studies, Mathematics and Social Studies, Hindi and Sanskrit, Gujarati and Mathematics, and English and Hindi. The percentage of teachers who had studied English and Sanskrit as special methods of teaching, was 1.50. The remaining teachers had chosen other subjects as special methods courses. Table 6 gives an analytical picture of the special methods courses studied by the teachers.

TABLE 6

Distribution of Teachers According to the Methods Courses Offered During Their Professional Training

Subjects	*N*	*Percentage*
History-Geography	9	4.50
Gujarati-Social Studies	47	23.50
Gujarati-Sanskrit	4	2.00
Maths-Science	43	21.50
English-Sanskrit	3	1.50
English-Gujarati	17	8.50
English-Social Studies	16	8.00

TABLE 6 (Contd.)

Subjects	*N*	*Percentage*
Hindi-Gujarati	9	4.50
English-Maths	4	2.00
Science-Social Studies	2	1.00
Hindi-Geography	4	2.00
Hindi-Sanskrit	2	1.00
Social Studies-Maths	2	1.00
Gujarati-Maths	2	1.00
English-Hindi	2	1.00
Any other subjects	34	17.00
Total :	200	100.00

Research Tools

The nature of investigation was such that it required the measures of teacher behaviour, personality traits and attitudes of the teachers. Flanders Interaction Analysis Category System (Flanders, 1966) was used to observe classroom verbal behaviour of teachers. Thurstone Temperament Schedule (Thurstone, 1950) was utilized to measure personality traits of the teachers. Scales developed by Wandt (1952), Glassey (1967), and Patel (1959) were adapted to study the attitudes of teachers.

Thurstone Temperament Schedule : This inventory provides information about how well-adjusted people differ from each other on important stable traits. This inventory of 140 items covers seven traits, namely, (1) Active, (2) Vigorous, (3) Impulsive, (4) Dominant, (5) Stable (emotionally), (6) Sociable, and (7) Reflective. It is self-administered. The reliability has been computed for the seven areas of the schedule by split half method for the five groups, viz., men, women, boys, girls and a group of men and women seeking counselling and employment through the university of Chicago.

The reliability coefficients vary from .45 to .86. The validity has been worked using several external criteria like effectiveness of job performance, teacher performance, etc. The validity coefficients against the ratings of groups of sales employees by the supervisors on these traits range from .81 to .95.

Attitude Scales : In all, eight attitude scales were used to measure teachers' attitude towards : (1) Management, (2) Parents, (3) Other Teachers, (4) Democratic Administrative Procedures, (5) Pupils, (6) Democratic Classroom Procedures, (7) Teaching Profession and (8) Education.

The first six scales were constructed by Wandt (1952) on Likert model. Each scale consists of twenty-four items, half of them expressing negative attitude and the other half, positive attitude. Test-retest reliability coefficients of the scales range from .58 to .96 with a median value of .81. As far as validity is concerned, discriminative value of each item has been computed by forming high and low scoring groups. The obtained ' t ' values are uniformly high, indicating efficacy of items in discriminating people having unfavourable attitude from people having favourable attitude. Scoring procedure and interpretation of scores are the same as suggested by Likert.

The seventh scale measuring attitude towards teaching profession was constructed by Patel (1959) following Thurstone method. The tool contains twenty-two items. The test-retest reliability of the scale is reported to be .86. The validity of the test was determined by correlating teachers' attitude scores with ratings of the principals. This correlation coefficient was found to be .56.

The eighth and final scale measuring attitude towards education was developed by Glassey (1967). It is a Thurstone type scale and contains thirty-four items. The subject checks those items with which he fully agrees and places a cross against the items with which he does not fully agree. He may place a question mark against the item, if he is totally unable to decide. The subject's score is the average of the scale values of items endorsed as " fully agree ". The higher the score of a subject, more positive is his attitude towards education.

The author has established the test-retest reliability of the Thurstone Temperament Schedule and the attitude scales on a sample of forty secondary school teachers. The reliability coefficients range from .36 to .91. Thirteen reliability coefficients are significant at .01 level and two are significant at .05 level.

Data Collection

Classroom teaching of all the 200 teachers under study was observed using Flanders Interaction Analysis Category System (FIACS). Each teacher was observed twice in the same class, teaching the same subject, for a complete peroid of thirty-five to forty minutes, but not less than twenty minutes. The two separate observations of the single teacher were combined into one. Frequency tables were formed and I/D and i/d ratios were computed.

Personality inventory and attitude scales were administered individually.

Analysis of the Data

The relationship between teacher behaviour (I/D and i/d ratios) and personality traits and attitudes was determined by product-moment correlation. Stepwise regression analysis was carried out to predict teacher behaviour using personality and attitudes as predictor variables.

Results and Discussion

Teacher Behaviour, Personality Traits and Attitudes

The product-moment correlation coefficients between measures of teacher behaviour and personality and attitudes are given in Tables 8 and 9 followed by a discussion of these correlations.

TABLE 8

Coefficients of Correlation between I/D, i/d and Personality Traits

Sr. No. of the Variables	*I/D*	*Signi-ficance*	*i/d*	*Signi-ficance*
1. Active	—0.03743	N.S.	—0.08285	N.S.
2. Vigorous	—0.00387	N.S.	—0.04434	N.S.
3. Impulsive	—0.03879	N.S.	—0.00683	N.S.
4. Dominant	—0.02184	N.S.	—0.02386	N.S.
5. Stable (emotionally)	—0.03601	N.S.	—0.02889	N.S.
6. Sociable	—0.02532	N.S.	—0.06390	N.S.
7. Reflective	—0.12419	N.S.	—0.16389	$P<.05$

*Sr. No. of variables are the same as they appear in hypotheses.

Table 8 reveals that the cofficients of correlation between teacher behaviour in the classrooms (I/D and i/d) and the personality traits are not significant except the one between i/d and the reflective trait of the teachers' personality, which is negative and significant at .05 level. Hence the null hypothesis 7, which asserts that, 'there is no significant relationship between teacher behaviour (I/D and i/d) and the reflective trait of teacher's personality is partially rejected, since the latter's relationship with I/D is not significant. This may be because reflective teachers show low but negative affect in the classrooms.

Table 9 which contains the coefficients of correlation between teacher behaviour in the classroom (I/D and i/d) and certain attitudinal variables reveals that, none of them is significant except in the case of democratic classroom procedures. It is found that attitude towards democratic classroom procedures has low but positive relationships with I/D and i/d, both being significant at .05 level. Hence the null hypothesis, namely, 'there is no significant relationship between teacher behaviour (I/D and i/d) and teacher's attitude towards democratic classroom procedures' is rejected.

By and large, teacher behaviour is not found to be significantly related to the personality traits and attitudes of teachers included in the present study.

TABLE 9

Coefficients of Correlation between I/D, i/d and Attitudinal Variables

*Sr. No. of the Variables**		*I/D*	*Significance*	*i/d*	*Significance*
8.	Management	0.01423	N.S.	0.13378	N.S.
9.	Parents	0.04388	N.S.	0.09190	N.S.
10.	Other Teachers	— 0.04891	N.S.	0.00290	N.S.
11.	Democratic Administrative Procedures	0.03988	N.S.	— 0.00671	N.S.
12.	Pupils	0.08016	N.S.	0.06289	N.S.
13.	Democratic Classroom Procedures	0.14964	$P<.05$	0.16517	$P<.05$
14.	Teaching Profession	0.02983	N.S.	0.02154	N.S.
15.	Education	0.04777	N.S.	0.10525	N.S.

*Sr. No. of variables are the same as they appear in hypotheses.

Personality Traits and Attitudes as Predictors of Classroom Behaviour

Table 10 provides results of stepwise regression analysis for predicting I/D ratio from personality traits and attitudes of teachers included in the present study.

TABLE 10

Results of Stepwise Regression Analysis for Prediction of I/D

*Sr. No. of the Variable**	*Multiple R*	*df*	*F-Values*	*Significance*
13	0.1496	1,198	34.84	$P<0.01$
7	0.1971	1,197	11.64	$P<0.01$
3	0.2077	1,196	2.64	N.S.
5	0.2166	1,195	2.21	N.S.
15	0.2209	1,194	1.08	N.S.
11	0.2250	1,193	1.02	N.S.
6	0.2294	1,192	1.09	N.S.
8	0.2328	1,191	0.86	N.S.
10	0.2390	1,190	1.53	N.S.
12	0.2410	1,189	0.51	N.S.
9	0.2431	1,188	0.52	N.S.
1	0.2448	1,187	0.41	N.S.
2	0.2452	1,186	0.11	N.S.
4	0.2453	1,185	0.02	N.S.
14	0.2453	1,184	0.00	N.S.

*Sr. No. of variables are the same as they appear in hypotheses.

As revealed in the above table, variable 13 (teacher's attitude towards democratic classroom procedures) proves to be the best predictor of I/D with a multiple R of 0.1496 which is significant at .01 level. A second predictor variable 7 (reflective trait) was added to variable 13 to know whether its addition helped in predicting teacher behaviour further. The resultant multiple R was 0.1971 yielding significant F-Value of 11.64. This implies that the addition of variable 7 to variable 13 makes the prediction of teacher behaviour (I/D) better. Variable 3 was then added to the set of variables 13 and 7 to see whether its addition also contributed in predicting teacher behaviour still further. The multiple R obtained as a result of combination of these three predictor variables was found to be 0.2077, which did not result into a significant increment. Similarly, remaining variables were added one at a time and regression equations yielding the multiple R's were computed. The values of these multiple R's were not indicating significant increments, that is the addition of these subsequent variables to variables 13 and 7 did not help in maximizing the prediction of I/D. The inefficiency of these variables in predicting I/D is reflected in obtained multiple R's. Not much difference is found between any two of the multiple R's. Regarding the extent of prediction of I/D by variables 13 and 7, it is seen that only four per cent of I/D is predicted by these two variables. Ninety-six per cent of teacher behaviour still remains unpredicted.

The two multiple regression equations which predict I/D ratio significantly are given below :

(1) $I/D = -.24 + .01X_{13}$

(2) $I/D = .07 + .01X_{13} - .03X_7$

Table 11 gives results of stepwise regression analysis for predicting i/d ratio from personality traits and attitudes of teachers included in the study.

TABLE 11

Results of Stepwise Regression Analysis for the Prediction of i/d Ratio

*Sr. No. of the Variable**	*Multiple R*	*df*	*F-Values*	*Significance*
13	0.1652	1,198	39.17	P<0.01
7	0.2359	1,197	18.22	P<0.01
8	0.2630	1,196	7.21	P<0.01
6	0.2858	1,195	6.23	P<0.05
15	0.2963	1,194	2.90	N.S.
2	0.3057	1,193	2.62	N.S.
14	0.3099	1,192	1.17	N.S.
10	0.3131	1,191	0.88	N.S.
1	0.3169	1,190	1.05	N.S.
12	0.3190	1,189	0.58	N.S.
11	0.3203	1,188	0.38	N.S.
9	0.3209	1,187	0.17	N.S.
4	0.3213	1,186	0.11	N.S.
5	0.3214	1,185	0.00	N.S.
3	0.3214	1,884	0.00	N.S.

*Sr. No. of the variables are the same as they appear in hypotheses.

It will be seen from Table 11 that variable 13 (teacher's attitude towards democratic classroom procedures) proves to be the best predictor of i/d with a multiple R of 0.1652 and F-Value of 39.17, which is significant at .01 level. The next useful predictor, variable 7 (reflective trait) was combined with variable 13 and multiple R was computed. The resultant multiple R was 0.2359 with F-Value of 18.22. This F-Value was found to be significant at .01 indicating its predictive value.

Later, variable 8 (teacher's attitude towards management) was added to variables 13 and 7 and a three variable regression equation was carried out. The obtained multiple R was found to be 0.2630, which was significant at .01 level. Similarly, variable 6 (sociable trait) was added to the first three variables and a four predictor regression was computed. This equation gave a multiple R of 0.2858 which was also significant at .05 level. Adding variable 15 (teacher's attitude towards education), again a five variable regression equation yielded a multiple R of 0.2963 which showed that increment in R was not significant. This means that addition of variable 15 to variables 13, 7, 8 and 6 does not maximize the prediction of teacher behaviour (i/d). The subsequent addition of the remaining variables also does not contribute to multiple R, obtained by combining variables 13, 7, 8 and 6, as is evident from the subsequent R values. Thus, it can be concluded that, out of fifteen personality and attitudinal variables only teacher's attitude towards democratic classroom procedures, reflective trait, teacher's attitude towards management, and sociable trait are capable of predicting teacher behaviour (i/d). Examining the extent of total behaviour predicted by the combination of these four variables, it is found that 8 percent of the i/d is predicted. The four multiple regression equations which predict i/d significantly are given below:

(1) $i/d = -.37 + .04X_{13}$

(2) $i/d = .82 + .04X_{13} - .12X_7$

(3) $i/d = -.40 + .04X_{13} - .12X_7 + .02X_8$

(4) $i/d = -.64 + .03X_{13} - .15X_7 + .02X_8 + .07X_6$

Summary and Conclusions

An attempt was made to correlate teacher's classroom verbal behaviour (I/D and i/d ratios) with certain personality and attitude measures, and to predict it on the basis of these variables. Of the fifteen variables, only teacher's attitude towards democratic classroom procedures and reflective trait of teacher's personality correlated significantly with teacher behaviour. With respect to the prediction of teacher behaviour, again the same two variables were found to be the best predictors of I/D, which could predict a variance of four percent. In the case of i/d, teacher's attitude towards democratic classroom procedures, reflective trait, teacher's attitude towards management, and sociable trait were found to be the useful predictors, explaining 8 percent of variance in i/d.

The findings may be summarized as under :

(1) Teacher's verbal behaviour in the classroom is related in a small measure to certain of his personality traits and attitudes. The results are similar to the findings of Davies (1961) mentioned earlier.

(2) Teacher's attitude towards democratic classroom procedures has a positive significant relationship with I/D and i/d.

(3) Reflective trait of teacher's personality has negative significant coefficient of correlation of —0.16389 with i/d. The same trait correlates —0.12419 with I/D and though the relationship is the highest among the various personality traits and I/D, it is not found to be significant.

(4) Teacher's attitude towards democratic classroom procedures and reflective trait are found to be the best predictors of I/D, which could predict criterion variance to the extent of four percent.

(5) In the prediction of i/d, teacher's attitude towards democratic classroom procedures, reflective trait, teacher's attitude towards management and sociable trait are found to be the best predictors. They can predict i/d to the extent of eight percent.

It is quite obvious, that, a large amount of variance remained unexplained while predicting I/D and i/d. This implies a need for dropping some of the variables and taking up additional factors to maximise prediction, or alternatively reducing unexplained variance. Persistent efforts will have to be directed by the researchers to this end.

5

EFFECT OF TEACHER INFLUENCE ON PUPIL ACHIEVEMENT

The Problem

There has been a perennial quest for teaching effectiveness. Society in general and administration in particular want maximum returns from instruction in education. This can only be achieved if the classroom instruction effectiveness can be raised. In the recent years, this has become the focus of educational researchers. Flanders Classroom Interaction Analysis is one such attempt. Flanders (1965) discovered significant relationship between teacher influence and pupil achievement and attitudes. On the basis of several correlational, field and experimental studies he concluded that indirect teacher influence is related to higher pupil achievement and more positive attitdues as compared to direct teacher influence. These findings have been corroborated by several other investigators (Anderson, 1939; Lewin, Lippitt and White, 1939; Withall, 1949; Perkins, 1950; Flanders, 1951; Wright et al., 1951; Flanders, 1965). Some studies failed to reveal significant relationship between them.

The recent ' presage-process ' research appears to be useful for teaching practice. It was, therefore, considered desirable to replicate Flanders' study to see how far his findings hold good in Indian classrooms. The present study is an outgrowth of this need. The study attempts to find out the effect of teacher classroom influence on the pupil achievement. It was a field experiment wherein teachers were trained to acquire indirect influence patterns of classroom behaviour and achievement of pupils under their charge was measured.

KU. T. P. LULLA

Sample

Forty-eight teachers teaching class VII were randomly selected from the municipal corporation schools of Baroda city. All the schools from which the teachers were drawn had almost similar conditions regarding class size, quality of teachers, facilities for teaching and management.

The sample comprised 1800 pupils of class VII. As all students were drawn from municipal corporation schools they usually came from middle and lower middle class homes with similar cultural backgrounds. It may, therefore, be assumed that they had almost similar socio-economic status and attitudes. The pupils in the control group and experimental group were administered an intelligence test and the scores of the two groups did not differ significantly indicating that the groups were matched on intelligence.

Design

The pre-test post-test and control group design was employed in the present study. The teachers with high I/D (Indirect/Direct) ratio formed the experimental group while the teachers with low I/D ratio constituted the control group. The students under the two groups of teachers were pre-tested and post-tested with regard to achievement.

Hypothesis

The pupils with indirect teacher influence in their classrooms achieve significantly higher than the pupils with direct teacher influence in their classrooms.

Tools Used

The following tools were used in the present study. A brief description of each of them is also given.

1. *Flanders Interaction Analysis Category System* (*FIACS*)

FIACS was used to observe the classroom behaviour of teachers. The details of this procedure of observation appear in Chapter II of this book.

2. *Desai-Bhatt Group Test of Intelligence*

This is a verbal test of intelligence developed by Desai and Bhatt. The test is meant for the pupils of age group 12 to 18. The coefficients of reliability of the test found by various methods ranged from .84 to .93. The validity of the test has been established against a verbal test (Desai Group Test) and a non-verbal test (Bhatt Group Test). The coefficients of validity range from .72 to .88.

3. *Achievement Test in Geography for Grade VII*

This test was constructed by the investigator with a purpose to measure initial ability of the pupils. The test was standardised on grade VI pupils of the municipal corporation schools of Baroda city. This test was prepared on the basis of the prescribed Geography book for grade VI.

4. *Achievement Test on the Unit 'The Arab Countries'*

The test has been constructed and standardised by the investigator on the selected teaching unit 'The Arab Countries'. The items with power of discrimination below .25 are not included.

Procedure

A. Teacher Training

The teachers were trained in interaction analysis. The duration of training was one week. The teachers were introduced to FIACS. The explanation of all the categories was given to them in detail and they were asked to memorize the categories. The emphasis was more on the categories contributing to the indirect pattern of teacher influence. The main focus of training was to motivate the teacher participants and to develop in them the skill whereby their influence in the classroom becomes more indirect.

B. Selection of Unit

A team of expert teachers in Social Studies was invited to decide a unit for teaching during the investigation. A four-week unit in Social Studies on 'The Arab Countries' was selected from the text-book for grade VIII. The printed booklet of the same was supplied to the pupils. This unit was new for all the teachers under study.

C. Teaching of the Unit

Special instructional material on the unit selected was prepared for the use of the teachers. It was supplied to ensure consistency. The selected teaching unit and the instructional material prepared were given to the teachers one week before the unit was to start. Care was taken to ensure that all the classes were exposed to the content for an equal amount of time.

To aid the teachers in imparting the same amount of knowledge to their pupils, expert teachers in Social Studies, who selected the unit, were requested to teach the same unit for a period of thirty-five minutes in order to acquaint the teachers with the method of teaching. This facility was provided to both the groups of teachers under study.

D. Scheme of Observation :

The investigator got her colleagues and trained teacher observers to observe classroom teaching.

To schedule eight units of the study in such a way that the two observers could observe each teacher twice a week, alternate weeks were assigned to them for observations. A single observation was of at least thirty-five minutes duration. Eight such periods of each teacher were observed. Certain interruptions like a visitor coming to the class, a circular being brought for the teacher or the pupil writing on the blackboard, filling the map, etc. were considered as 'no verbal interaction periods' and ignored.

Statistical Analysis

To test the significance of difference between the means of the two groups t-test was applied. Product-moment correlation was used to find out the relationship between the pre-test and post-test achievement scores of both the groups. To control the effect of the initial achievement of pupils, the technique of covariance was employed.

Before data were collected, the observers were duly trained in observation and inter-observer reliability by computing Scott's coefficient was established. An achievement test was used as pre-test to know their previous knowledge. A group test of intelligence was administered to determine their I.Q. and for further application of statistical control, if necessary. Each observation was for a period of thirty-five minutes. After the teaching unit was taught, the post-test was administered to the pupils to assess their final achievement. Data of classes handled by four of the teachers of the control group could not be collected as the former were transferred from their schools.

Results and Discussion

Initial Ability of the experimental and controlled group

Pre-test was given to both the groups in the initial stages of the experiment to compare the groups in terms of initial ability. The results are given in the table below :

TABLE 1

Mean, SD and t-value of Pre-test Achievement Scores of Pupils of Experimental and Control Groups

Group	*N*	*Mean*	*SD*	*t*	*Remarks*
Experimental group	642	23.27	7.78	7.5	Significant at .01 level
Controlled group	642	26.30	6.14		

Tables 2 and 3 give the summaries of the analyses of variance and covariance, respectively.

F-ratio in the case of initial ability for the two groups was found to be 55.94. The tabulated value of F, with df $\frac{1}{1282}$ at 0.01 level is 6.64, therefore the mean difference between the two groups in initial ability is significant beyond .01 level. Furthermore, in the case of post-test scores of the two groups the

F-ratio was found to be 379.76 with df $\frac{1}{1282}$, which is significant beyond .01 level indicating significant mean differences between the two groups in achievement after the treatment. It seems that the hypothesis cannot be rejected. Since there are significant mean differences between the two groups in initial ability, no appropriate interpretation can be done unless they are adjusted by covariance technique. Table 3 shows the analysis of covariance for pre and post-test adjusted for initial achievement of the pupils.

TABLE 2

Analysis of Variance of Pre and Post Achievement Scores

Source of Variation	*df*	SS_x	SS_y	MS_x (V_x)	MS_y (V_y)
Among means	1	2752.65	4690.13	2752.65	4690.13
Within means	1282	63075.58	15841.02	49.20	12.35
	1283	65828.23	20531.15		

$F_x = 55.94$
$F_y = 379.76$

From Table F : df = 1/1282
F at 0.01 level = 6.64

TABLE 3

Analysis of Covariance of Pre and Post-test Scores
(subject as unit of analysis)

Source of Variation	*df*	SS_x	SS_y	SS_{xy}	$SS_{y \cdot x}$	$MS_{y \cdot x}$ $(V_{y \cdot x})$	$SD_{y \cdot x}$
Among means	1	2752.65	4690.13	—3590.09	5867.71	5867.71	3.26
Within means	1281	63075.58	15841.02	11742.85	13653.73	10.65	
Total :	1282	65828.23	20531.15	8152.76	19521.44		

$F_{y \cdot x} = 550.95$

From Table F : df = 1/1281
F at 0.01 level = 6.64

Through the application of analysis of covariance, an attempt is made to find out whether difference between criterion means remains significant after statistical adjustment for the effect of the covariate has been made. In other words, by analysis of covariance an attempt is made to approximate the situation in which each of the treatment groups is equated on the covariate and this approximation procedure assumes that the linear model is appropriate. Now, looking into Table 3, the F value is found significant at .01 level. Due to adjustment of the treatment, that is, through analysis of covariance, the differences have become still more distinct with the increase in the level of significance.

The adjusted means for the control and the experimental groups are 13.50 and 17.86, respectively. This implies that indirect teacher influence is superior to direct teacher influence in the classroom with regard to pupil achievement.

Conclusion

The present study has revealed that the pupils who were taught by the teachers trained in using indirect behaviour scored higher, as compared to their counterparts studying under the teachers who were not provided any training. It is also implied that the indirect teacher behaviour may raise the interaction potential of the classroom climate resulting in free communication and open interaction between the teacher and the group of pupils. It has been found that such an atmosphere will not only stimulate the learner in learning but also provide a congenial climate to the teacher for conducting his teaching which is the prime objective of schools, because strictly speaking, schools and the teachers are supposed to educate the pupils. Quite a good number of studies have found that, though not always, in most situations indirect behaviour is better for enhancing learning on the part of the child. Hence, provision may be made to modify the behaviour of teachers from direct to indirect.

More research of this kind is needed to study each specific problem concerning classroom situations. So far, hardly any efforts have been made to modify direct influence. Problems concerning practice-teaching and teaching effectiveness are of importance to improve quality of education. In-service and reorientation programmes will help teachers to make classroom learning more effective.

New tools should be developed for observation of classroom interaction depending upon the objective of the investigation. Non-verbal communication should also be studied in consistency with verbal communication. Likewise, researches in different aspects of classroom should be undertaken to improve teaching-learning process.

6

AN INQUIRY INTO THE RELATIONSHIP BETWEEN THE PUPILS' ATTITUDES AND TEACHER INFLUENCE IN THE CLASSROOM

Introduction

Teaching and learning constitute two major aspects of any system of education. Of the two, learning has received considerable share of attention of behavioural scientists. The teaching aspect, however, remained neglected till 1960's when researchers like Barr, Ryan, Gage, Flanders, Smith, and Bellack started taking interest in this aspect also and made valuable contribution towards the development of theory of teaching.

By and large, however, the available studies have concentrated on the "criterion approach" to research on teaching and very few attempts have been made in India to adopt the "interaction approach" to study the effect of teacher behaviour on non-cognitive effects such as students' attitudes. The present study is a step in this very direction. It seeks to study the effect of teacher behaviour in the classroom on pupils' attitude towards self, teachers, school, and other related variables.

Problem

The present study, viz., "An inquiry into the relationship between the pupils' attitudes and teacher influence in the classroom", aimed at inquiring into the relationship, if any, between the teacher influence in the classroom and the development of attitudes amongst pupils. The teacher influence in the classroom or the teacher classroom behaviour was measured in terms of I/D and i/d ratios. The areas of pupils' attitudes

Y. PATEL

that were considered in the study were, (a) personal anxiety, (b) motivation and classroom organisation, (c) attitude towards reward and punishment, (d) independent behaviour, (e) attitude towards teacher, (f) classroom climate, and (g) attitude towards school. The above areas of pupils' attitudes have also been selected in similar studies at Minnesota and Michigan. The present study is a descriptive correlational study wherein the teacher influence is treated as an independent variable and the pupils' attitudes in the different areas mentioned above as dependent variables

Hypotheses

The following were the hypotheses in the study. Teacher classroom behaviour does not influence

(a) pupils' personal anxiety;
(b) pupils' motivation and classroom organisation;
(c) pupils' attitudes towards reward and punishment;
(d) the development of independent behaviour on the part of pupils;
(e) pupils' attitudes towards teacher;
(f) the classroom climate; and
(g) pupils' attitudes towards the school.

Sample

A stratified random sample of 100 teachers of primary schools run by the Ahmedabad Municipal Corporation who had at least 60% of teaching work in a particular class was selected. This was done to overcome the problem of attitude formation. The stratification of the sample was done on the basis of the socio-economic conditions of the communities in which the schools (of the teachers) located, the different areas of the city, and the variables like age, experience, training, sex and marital status of teachers. The pupils included in the study belonged to History, Geography and language classes of standard VII taught by the teachers of the sample.

Tools

The following tools were used to measure the variables selected for the study:—

1. *Flanders Interaction Analysis Category System* (*FIACS*):

FIACS was used to measure teacher influence or teacher classroom behaviour of teachers in terms of their direct-indirect influence or behaviour (I/D and i/d ratios). The details about this tool appears in Chapter 2.

2. *Attitude scales to measure pupils' attitudes:*

The following seven attitude scales related to the seven different areas of pupils' attitudes considered in the study were used. They were either adapted or adopted depending upon their suitability to Indian conditions. The first four of them were developed by Flanders (1966) and used in his studies. The last three were taken as they were available ready for use elsewhere.

(*a*) *Scale I: Personal anxiety:* The original scale consists of fifteen items. The items were retained in the study as they were since they were suitable to the classroom conditions of the sample considered. The items generally refer to real or imagined fears and confusion that a pupil might perceive, *e.g.*, " Are you afraid when you don't finish your work?" or "Do you hide things from your teacher?" The scale is scored for 'lack of anxiety'. The higher the score on the scale, the lesser is the anxiety indicated and the lesser the score, the higher is the anxiety indicated. The subject is supposed to mark 'yes' or 'no' on the scale. Correct responses corresponding to lower personal anxiety as given in the key, are given a score 'one' each. The test-retest reliability coefficient established for the scale is found to be .78.

(*b*) *Scale II: Motivation and Classroom organisation:* The scale consists of thirteen items. The items generally refer to observations and reactions that a pupil might have towards his classwork, *e.g.*, "Does your teacher help the slow ones to catch up in a nice way?" or "Do you have more time to finish your work if you need it?" The higher the score on the scale, the higher motivation and the better classroom organisation is indicated. The subject has to respond either 'yes' or 'no' on the scale. According to the key provided, correct responses which indicate higher motivation and better classroom organisation are scored 'one' each. The test-retest reliability coefficient is found to be .70 for this scale.

(*c*) *Scale III: Attitude towards reward and punishment:* This scale, after edition and modification consists of thirteen items. The items rarely refer to the acts of reward, but mostly punishment, that might occur in the classroom, *e.g.*, "Has your teacher ever punished you for something you didn't do?" or "Does the teacher make you feel foolish?" The respondents are supposed to indicate either 'yes' or 'no' on the scale. Correct responses are scored 'one' each according to the key indicating fair rewards and punishments. Higher score indicates positive attitude towards rewards and punishments. The reliability coefficient by test-retest method is found to be .81.

(*d*) *Scale IV: Development of Independence:* The original scale of twelve items was retained with slight modification through the change of sentence construction. The items of the scale refer to the pupils' tendency to wait for the teacher to tell him what to do and to depend on the teacher's directions in carrying out work. The higher is the score, the greater is the independence, *e.g.*, if a pupil marks 'yes' against the item "When you have free time, can you read any book you want?", he gets one score according to the key, indicating greater independence, whereas if he marks 'no' against the same item, he gets zero score. The test-retest reliability coefficient computed is found to be .79.

(*e*) *Scale V: Attitude towards the teacher:* This scale consisting of forty-five items was prepared and standardised by Kumar (1972). Each of the items is to be marked on a five-point scale. The items generally refer to pupil's attitude towards his own teacher. The scoring key indicates one score for " always ", two for " mostly ", three for " sometimes ", four for " once " and five for " never ". The items refer to what the pupils think about their teacher. The items vary from favourable to unfavourable attitudes. Provision is made for marking any one number out of the given five numbers expressing thereby their attitude towards the teacher; *e.g.*, if a pupil marks " sometimes " against the item " The teacher takes interest in the activities of the school. ", he gets a score of three and if he marks " always ", he gets a score of one. The total score indicates the favourableness or unfavourableness of the attitude towards the teacher. The higher is the score, the more favourable is the attitude towards the teacher. The test-retest reliability coefficient is found to be .78.

(*f*) *Scale VI: Classroom climate:* The scale consists of eighteen items which indicate different aspects of classroom climate, *e.g.*, " Pupils are not allowed to sit in the classroom during the recess. " or " Behaviour is more emphasised than study in our school. " The respondents are asked to mark " agree " or " disagree ". The higher is the score, the better is the classroom climate which provides the better opportunities for pupils to learn and for teachers to teach well. The test-retest coefficient is found to be .76.

(*g*) *Scale VII: Attitude towards the school:* This scale constructed and standardised by Kumar (1972) consists of twenty-four items. The items refer to the pupils' ideas about their own school, *e.g.*, " Do you believe that the time is wasted in the school? " or " Do you wait for Sundays and other holidays? " The scale provides for marking " yes " or " no ". Correct responses indicating favourable attitude towards the school are scored ' one ' each. Hence, the higher is the score the more favourable is the attitude towards the school and the lesser is the score the more unfavourable is the attitude towards the school. The reliability coefficient found by test-retest method is found to be .79.

Data Collection

This involved two steps—the classroom observation of the teachers in the sample using FIACS and administration of the attitude scales to the pupils taught by those teachers.

Scheme of observation: After the schools and the teachers in them were sampled out, the purpose of the study was explained and schedules of observation were discussed and fixed in consultation with the teachers. The scheme was made such that each teacher was observed for two 30 minute periods. The second observation was made when the teacher dealt with the same class on the occasion immediately next to the first observed occasion. Thus the second observation was the continuation of the first one from the content point of view.

The amount of time "to be disregarded" was deducted from the total time of observation and "effective observation period" was computed and recorded in the case of individual observation. Certain non-verbal interaction periods, such as a circular being brought to the classroom, a visitor coming to the class, or the teacher or the student writing on the blackboard were disregarded.

Administration of attitude scales: All the seven scales mentioned earlier were administered individually to the pupils of the selected classes, after the observations having been made.

Statistical Techniques

Following standard procedure, individual matrix was prepared for each of the 100 teachers observed and for each teacher, Indirect/Direct (I/D) and indirect/direct (i/d) ratios which are the measures of teacher influence were computed.

These ratios (I/D and i/d) were used to identify most direct and most indirect teachers from among the sample. Out of 100 teachers observed, top 25 teachers having high I/D ratios and bottom 25 teachers with low I/D ratios as well as top 25 teachers with high i/d ratios and bottom 25 teachers with low i/d ratios were selected for the analysis. Means and standard deviations of the attitude scores on each scale of the pupils were calculated for each class. The student t-test technique was employed to test the significance of difference between means of the two extreme groups (based on I/D and i/d ratios).

Results and Discussion

After having formed two extreme groups—high and low in I/D ratio (top 25% and bottom 25%, respectively), the means and standard deviations of the scores of the groups on each of the attitude scales along with the t-ratio for each difference were computed. The results are presented in Table 1.

The table reveals that teachers with high I/D ratio are significantly better than with low I/D ratio in their influence upon pupils regarding motivation and classroom organisation (significant at .05 level) and in the development of favourable attitude towards themselves (teachers) the difference being significant at .01 level. With regard to the other variables included in the study, the groups do not differ significantly.

Similarly, the results of the two extreme groups of teachers —high and low in *i/d* ratio (top 25% and bottom 25%, respectively)—are presented in Table 2. The table includes the means, standard deviations and the *t*-ratio of the two groups with regard to each of the aspects of pupils' attitude included in the study. The table reveals that the teachers with high i/d ratio are significantly better in the reduction of personal anxiety among pupils (significant at .05 level), in the development of motivation and better classroom organisation (significant at .01 level), in developing greater independent behaviour on the part of pupils (significant at .01 level), and in improving classroom climate (significant at .05 level). The groups do not differ significantly with regard to the development of favourable pupil attitude towards reward and punishment as well as towards school.

These results are interpreted and discussed below in the light of the hypotheses formulated and earlier related studies.

The teacher behaviour is supposed to influence the mental state of the pupils in the sense that a particular behaviour can

TABLE 1

Means, SD's and t-Ratio for the Scores on Attitude Scales of Two Groups of Teachers of High and Low I/D Ratio (N = 25 each)

Name of the Scale	*Group with high I/D ratio*		*Group with low i/d ratio*		*t-ratio*
	Mean	*SD*	*Mean*	*SD*	
1. Personal Anxiety	8.15	1.67	7.70	1.49	1.01
2. Motivation and Classroom Organisation	9.10	1.21	8.52	0.81	1.99*
3. Attitude towards Reward and Punishment	8.93	1.67	8.10	1.79	1.70
4. Independence	6.36	1.02	6.11	1.21	0.77
5. Attitude towards Teacher	143.60	12.08	134.90	11.53	2.60**
6. Classroom Climate	7.16	1.06	7.11	1.43	0.14
7. Attitude towards School	17.95	2.54	17.94	2.53	0.001

* Significant at .05 level. ** Significant at .01 level

TABLE 2

Means, SD's and *t*-Ratios for the Scores on Attitude Scales of Two Groups of Teachers of High and Low I/D Ratio (N = 25 each)

Name of the Scale	*Group with high i/d ratio*		*Group with low i/d ratio*		*t-ratio*
	Mean	*SD*	*Mean*	*SD*	
1. Personal Anxiety	7.85	1.30	7.14	2.22	1.99*
2. Motivation and Classroom Organisation	8.90	0.29	8.08	1.24	2.65**
3. Attitude towards Reward and Punishment	9.10	1.21	8.69	1.73	0.97
4. Independence	7.00	0.18	6.34	0.27	2.58**
5. Attitude towards Teacher	144.00	10.15	135.13	11.48	2.90**
6. Classroom Climate	7.27	0.96	6.65	1.18	2.03*
7. Attitude towards School	18.44	1.87	17.40	2.66	1.60

* Significant at .05 level ** Significant at .01 level

cause more anxiety amongst pupils whereas a different type of behaviour can put the pupils' mind at rest. When the teacher behaviour is considered in the context of subject matter (I/D ratio) the results show that the teacher behaviour does not influence the state of anxiety of the pupils. But the teacher influence devoid of content matter (i/d ratio) does influence the anxiety level amongst the pupils.

Considering the results related to I/D ratio, it may be said that both direct and indirect teachers can increase the anxiety level of pupils. An indirect teacher puts the pupils into such situations where their involvement in teaching-learning process is forced and they have to take initiative. Pupils who are not accustomed to such situations develop a different type of anxiety. In case of direct teachers it is the authoritarian attitude of the teacher that increases the level of anxiety because of the fear of the teacher. Hence the difference between the groups of teachers in increasing the level of personal anxiety among pupils is not significant. If the teacher influence is measured in terms of i/d ratio, the difference between the two groups of teachers is significant indicating that pupils of teachers with indirect influence have a low level of anxiety than the pupils of teachers with direct influence.

Experimental studies with anxious children show that they are very much dependent on the positive and encouraging attitudes of others towards them. If the dependency need of the anxious child is satisfied, his performance is less adversely affected. Teacher behaviour has to be oriented towards reduction of anxiety in the child. Hardly any study is there showing the relationship between teacher influence and pupils' anxiety. A few studies have been reported by Flanders (1966). In both Minnesota and Newzealand studies of Flanders (1956-57), it was found that the pupils of teachers with more indirect influence showed less anxiety than pupils of direct teachers. Hence the first hypothesis, viz., " Teacher classroom behaviour does not influence pupils' personal anxiety " is partially accepted. The partial acceptance is necessary as the difference is significant or not significant depends upon whether the content is taken out or included in the measure of teacher behaviour.

Regarding the second hypothesis, viz., " Teacher classroom behaviour does not influence pupils' motivation and classroom organisation ", the results indicate that irrespective of the fact whether teacher influence is measured by I/D ratio or i/d ratio, the pupils of the indirect teachers or pupils exposed to indirect teacher influence are more motivated and have better classroom organisation than the pupils of teachers who are direct in their influence in the classroom.

Referring to category two of FIACS, when the teacher praises or encourages the pupil, it carries the value judgment of approval. There is warmth and friendliness along with the approval in such teacher statements. When the teacher accepts, clarifies or uses constructively pupils' ideas, they are encouraged to participate further. Teachers with such abilities can often stimulate positive feelings of motivation and control negative feelings that might otherwise get out of hand. This type of atmosphere and attitude does motivate pupils more and more to learn and thus indirect influence (categories one to four) encourages pupil participation. On the contrary, direct influence hinders pupil participation leading to slackening of motivation among pupils. This may further lead to some discipline problems. Flanders (1960) has pointed out that the most direct teachers had more discipline problems and they gave longer and more involved directions and often had to repeat directions by indirect teacher influence. However, the idea that a pupil is highly motivated and is provided better classroom organisation, which may further lead to better learning, is supported by the findings of the present study. Hence, the second hypothesis is rejected.

The third hypothesis, viz., " Teacher classroom behaviour does not influence pupils' attitude towards reward and punishment " is supported by the findings of the present study. The study has revealed that the teacher influence neither in terms of I/D ratio nor in terms of i/d ratio makes any significant discrimination between the attitudes of pupils of direct or indirect teachers. Hence, the hypothesis is not rejected.

The fourth hypothesis, viz., " Teacher classroom behaviour does not influence the development of the independent behaviour on the part of the pupils ", is partially supported by the results of the present study. It implies that teachers having indirect influence devoid of content emphasis (i/d ratio) have significantly more influence on the development of the independent behaviour of their pupils than those with direct influence. If the content emphasis is taken into consideration (I/D ratio), there is no significant difference between teachers having indirect or direct influence on the development of independent behaviour of their pupils. In a study by Filson (1957) direct measure of dependent acts by students were associated with different patterns of teacher influence. His study has revealed that during a task when goal is not clear, more direct influence elicited more requests for teacher approval and help during the work periods. Anderson's (1960) study has revealed that junior high school boys and girls have significantly different ideal expectations about behaviour of their teachers and that students classified as " dependent-prone " tended to expect different teacher behaviour as compared to the " independent-prone ".

The fifth hypothesis, viz., " Teacher classroom behaviour does not influence pupils' attitudes towards teacher " is not rejected in the light of the results of the present study. The pupils of the teachers with indirect influence (both in terms of I/D and i/d ratios) have significantly more favourable attitude than the pupils of teachers with direct influence in the classroom. Experimental studies carried out by Flanders (1960), Anderson (1960), and Amidon and Flanders (1963) have revealed that pupils like indirect teacher more than the direct teacher, thus supporting the findings of the present study.

The sixth hypothesis, viz., " Teacher classroom behaviour does not influence the classroom climate " is partially rejected. The study reveals that teachers having indirect influence in their classroom teaching without content emphasis (i/d ratio) do create more effective classroom climate than direct teachers (low i/d ratio). This implies that the teachers who show more acceptance of pupil feelings and behaviour and use constructively pupil ideas expressed in the classroom discussion create more effective classroom climate.

The last and the seventh hypothesis, viz., "Teacher classroom behaviour does not influence pupils' attitude towards the school" is rejected. The present study reveals that the pupils exposed to indirect teacher influence do not differ significantly from pupils exposed to direct teacher influence in their attitudes towards school. This is true when teacher influence is measured in terms of I/D ratio or i/d ratio. This may be because the attitude formation towards school may be a very slow process and is influenced by various other aspects of the school system and the duration of observation of teachers in the present study may be too short for attitude formation towards school. Anyway, this needs further empirical probe.

Conclusion

The present study, viz., "An inquiry into the relationship between the pupils' attitudes and teacher influence in the classroom" was intended to inquire into the relationship between teacher influence (in terms of I/D and i/d ratios) and the attitudes of the pupils in different areas, viz., (a) personal anxiety, (b) motivation and classroom organisation, (c) attitude towards reward and punishment, (d) independent behaviour, (e) attitude towards teacher, (f) classroom climate, and (g) attitude towards school. The study has revealed that indirect teacher influence (I/D and i/d ratios) has favourable effect on motivation and classroom organisation and also on the attitude towards teacher. But when teacher influence without content emphasis (i/d ratio) is taken into consideration, indirect teachers have favourable influence on personal anxiety of their pupils, on the development of independent behaviour among their pupils and on the classroom climate.

7

RELATIONSHIP BETWEEN PATTERNS OF TEACHER CLASSROOM BEHAVIOUR AND PUPILS' ATTAINMENT IN TERMS OF INSTRUCTIONAL OBJECTIVES

A considerable part of the recent research in the field of education is being devoted to the area of teacher effectiveness. According to Flanders and Simon (1969), " teacher effectiveness is an area of research which is concerned with relationships between the characteristics of teachers, teaching acts, and their effects on the education outcomes of classroom teaching. "

A review of the researches in this area by Morsh and Wilder (1954), Bellack and Hueber (1960), Smith (1962), Anderson and Hunka (1963), Medley and Mitzel (1963), Ryans (1963), Amidon and Simon (1965) and Gage (1965) spotlighted a few considerations for the future researches. They concluded that (i) even examples of best teaching may not provide the theoretical basis for the most effective teaching, (ii) more powerful statistical methods are required to identify relationship between teacher behaviour and its effects, (iii) collection of observational data is the most direct way of learning about teaching, and (iv) a conceptual framework for understanding research findings on teaching is necessary.

The above mentioned conclusions have given a lead to researches in this area. It has been found that teacher behaviour is related to pupil achievement (Flanders and Simon, 1969). So far, the research in the direction of linking the process of teaching and the product of teaching has been general in nature. Nearly all the studies have taken one or the other dimension of teacher behaviour for creating a tool in the experimental treatment and then have related it either to general achievement or attitudes of pupils. There has been hardly any attempt

S. SHARMA

to relate teacher behaviour to specific cognitive achievement of the pupils. Recently, there has been a demand for the study of cognitive aspects of teacher behaviour (Gage, 1965; Getzels and Jackson, 1963; Flanders, 1965). Another question raised, is of finding evidence, on the related question of how much effect differences in teacher behaviour acts are likely to be there on the amount which pupils learn in the classroom (Wright and Nuthall, 1970). These are some of the considerations that led to the undertaking of the present investigation.

The study has its genesis and rationale in terms of three reasons, namely, (i) the need for studies on teacher effectiveness, (ii) the need for studies with pupil achievement as the criterion variable with further specifications in terms of instructional objectives, and (iii) the need for studying these two independent and dependent variables in experimental conditions.

Objective of the study

The study is an attempt to see the relationship between the process (four patterns of teacher classroom behaviour) and product (pupils' attainment in terms of three instructional objectives—knowledge, comprehension and application).

The general objective of the study is to see the relative effectiveness of the four different patterns of teacher classroom behaviour, namely, (i) narration, (ii) open questions, (iii) narrow questions, and (iv) narrow questions with feedback, upon the pupils' attainment in terms of the instructional objectives—knowledge, comprehension and application, belonging to cognitive domain of educational objectives.

The basic assumptions involved in the study are:

(i) There are certain patterns of teacher classroom behaviour which a teacher should create in the classroom for better achievement of students.

(ii) Teachers can be trained to produce these patterns.

These two assumptions lead to the very objective of the study—are there any identified teacher behaviour patterns related to pupils' attainment? The investigator has attempted to go deep into this relationship by specifying pupils' attainment in terms of three instructional objectives in the cognitive domain.

Hypotheses

Keeping in view the above framework, three hypotheses have been formulated :

(i) There will be no significant difference in the attainment scores for knowledge, when the pupils are being taught in any of the four patterns.

(ii) There will be significantly low attainment in terms of comprehension and application objectives, when the pupils are being taught in Pattern I as compared to other three patterns.

(iii) There will be significantly high attainment in terms of application objective when the pupils are being taught in Pattern II.

Design of the Study

The study employed one way analysis of covariance experimental design with four replications in each treatment condition. The four treatment variables, namely, four patterns of teacher classroom behaviour, (i) narration, (ii) open questions, (iii) narrow questions, and (iv) narrow questions with feedback, employed through three teachers, would normally result into twelve experimental conditions. But the teacher variables in terms of age, sex, qualifications and experience were kept constant, thus, resulting into four experimental treatments mentioned above. Twelve different classes were taught under each of the treatments. This resulted into 4 (treatments) × 3 (teachers) × 4 (replications) and that is, forty-eight classroom teaching sessions. Each teaching session was planned to be conducted in an independent classroom, thereby, resulting into forty-eight different classroom units. The tabular form of the design for global presentation is given below in Table I.

TABLE I

Design of the Study

Patterns→ *Teachers* ↓	P_1	P_2	P_3	P_4
T_1	C_1	C_{13}	C_{25}	C_{37}
	C_2	C_{14}	C_{26}	C_{38}
	C_3	C_{15}	C_{27}	C_{39}
	C_4	C_{16}	C_{28}	C_{40}
T_2	C_5	C_{17}	C_{29}	C_{41}
	C_6	C_{18}	C_{30}	C_{42}
	C_7	C_{19}	C_{31}	C_{43}
	C_8	C_{20}	C_{32}	C_{44}
T_3	C_9	C_{21}	C_{33}	C_{45}
	C_{10}	C_{22}	C_{34}	C_{46}
	C_{11}	C_{23}	C_{35}	C_{47}
	C_{12}	C_{24}	C_{36}	C_{48}

Note : T_1, T_2 and T_3 designate three teachers involved in the study and $C_1 \ldots\ldots C_{48}$, forty-eight classes of VII grade.

The details of treatments and criterion variables as well as the control of intervening variables are given below.

Variables—Treatment and Criterion

The four patterns of teacher classroom behaviour, served as the treatment variables for the present study.

Patterns of Teacher Classroom Behaviour

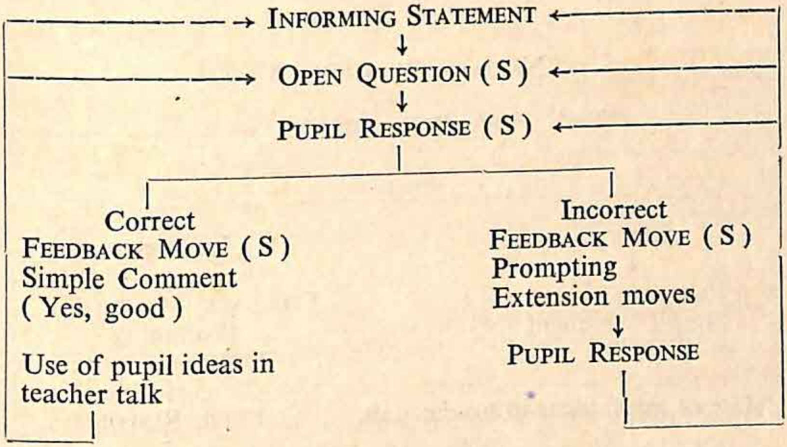
A pattern has been defined as a short chain of events that can be identified, occur frequently and can be given a label (or name) since this often facilitates thinking. In this context, the patterns of teacher classroom behaviour means those chains of events (shortest possible act that a trained observer can identify and record) that a teacher shows while teaching in the classroom. On the basis of the reviewed research literature, four patterns, namely, (i) narration, (ii) open questions, (iii) narrow questions, and (iv) narrow questions with feedback were specified as the treatment variables for the present investigation.

Narration (*Pattern I*): It embodies 'explaining' by the teacher. The teacher is expected to plan the lesson according to the selected instructional objectives in such a way, that the necessary sequencing of the material can be executed without any active involvement of the pupils.

Open questions (*Pattern II*): In this study open questions refer to all such questions which may be answered in a number of ways and these allow pupils to introduce their own experiences and feelings. The content is so sequenced as to follow a pattern, *viz.*, 'narration—open question—pupil response-teacher feedback—open question or narration'. However, in certain cases the teacher is allowed to ask a few, comparatively more structured questions, before inviting the pupil response to a minimum structured question. As mentioned above, the pattern provides for the feedback by the teacher. The feedback has been structured in terms of teacher's positive and corrective responses only. The positive feedback implies a teacher's reaction to the correct responses of the pupil. He may praise the pupil for it and/or use pupil ideas in his own explaining. The corrective feedback implies a teacher's response to an incorrect answer given by pupil, where he does not outrightly reject the pupil. The teacher encourages the pupil to give correct answers by giving 'prompts'. The term 'prompt' means giving hints for further information. The corrective feedback also implies the use of 'extension moves' which Church (1971) has defined as calling for further or better information without giving any prompts. Diagram I presents a flowchart for this pattern.

DIAGRAM I

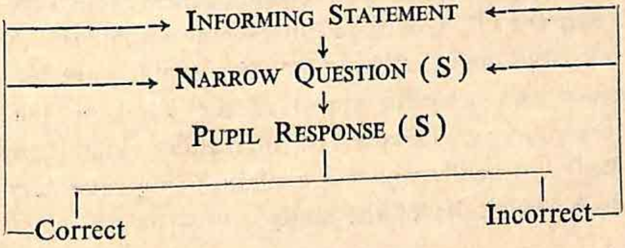
Flow Chart of Pattern II



Narrow questions (*Pattern III*): This pattern implies a teacher's asking highly structured questions as opposed to open questions. These questions are in close context of the lesson's contents. No feedback is to follow pupil response. Diagram II presents Pattern III.

DIAGRAM II

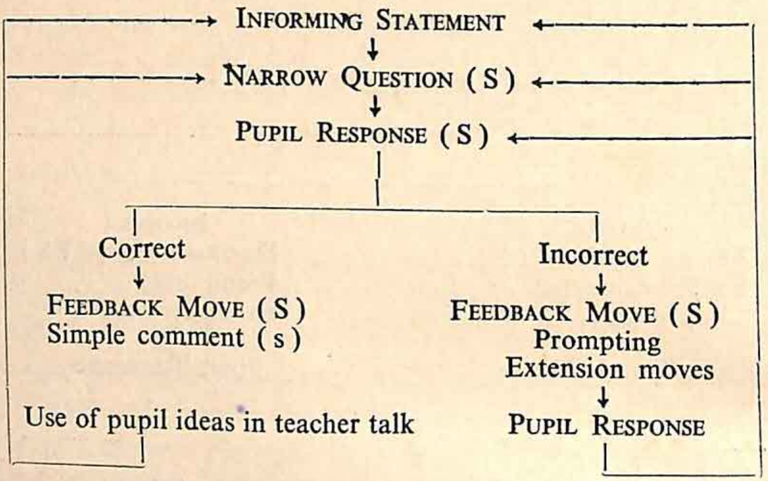
Flow Chart of Pattern III



Narrow questions with feedback (*Pattern IV*): This pattern envisages the use of narrow questions as for Pattern III along with the use of feedback as described in Pattern II. Diagram III presents Pattern IV.

DIAGRAM III

Flow Chart of Pattern IV



The criterion variables in the present study relate to the measures of pupils' attainment in terms of three selected instructional objectives, namely, knowledge, comprehension, and application defined on the lines of Bloom (1956).

Intervening Variables

The design of this study is likely to allow two types of intervening variables—'teachers' and 'pupils'. The age, sex, experience and qualifications of the teachers were kept similar to rule out the effect of these intervening variables. As far as intervening variables relating to the pupils are concerned, intelligence and pre-achievement of the pupils in the subject of history were considered to be intervening variables and were controlled statistically which is explained in greater details while presenting the results of the study.

Selection of Teachers

Since the teachers were the only agents to provide treatments in the classroom units, selection and especially the training of teachers was important. In order to control the influence of inter-teacher variations, it was planned to have minimum number of teachers having maximum homogeneity with respect to some important related teacher variables. It was decided to select three teachers of the same sex, similar age, experience, qualifications and recency of training.

In order to choose three teachers, the investigator contacted thirty teachers of both the sexes. These teachers were orally explained the purpose and design of the study and their cooperation was sought. Out of this pool of thirty teachers, twenty teachers showed a willingness to participate in the experiment. Finally, three female teachers were selected.

These three female teachers belonged to the age group 22-24 all were trained graduates and had no other teaching experience except for the teaching practice as a part of a training programme prior to this experiment. All of them had got their professional degree two years earlier to this experiment and had taken up jobs as fresh teachers.

Content of Lessons

A pilot study involving two experienced teachers, who instructed pupils of VII grade a unit of history on 'Coming of Aryans to India', selected for the experiment, was conducted. It helped in determining the content and sequence of lessons as well as in the preparation of instructional material. These two teachers were first briefed about the three instructional objectives, namely, knowledge, comprehension and application, and four patterns of teacher classroom behaviour. The unit on Aryans was taken from the course content of VIII grade. It had been assumed that this topic was new to all the pupils of VII grade. The teachers were given this unit and they were asked to plan their lesson in such a way as to cover all the three above mentioned objectives through 'narration' only. Their teaching was tape-recorded and later on transcripts were prepared. The time required to cover the content was noted. These transcripts were further scrutinised by a committee of five experts, including the two teachers who taught in the pilot study, to see that the three selected instructional objectives have been taken care of in the teaching of the unit. After necessary modifications, these transcripts were again handed over to these two teachers. They were asked to prepare open and narrow questions to help develop the three objectives in place of pure narration. These questions were incorporated in the transcript of teaching through narration in accordance with the treatment variables. The two teachers were again taken to different classrooms to give four lessons each in the four patterns. It helped to see the working of these four behaviour patterns in actual classroom situations. On an average, they took about fifty-five to sixty minutes to complete the unit in each pattern. Hence, the time for teaching through treatment variables was fixed to be within fifty-five to sixty minutes, distributed over two class periods. Thus, the content and the lesson plans using four patterns of teacher classroom behaviour were prepared.

Programme of Training Teachers

The three teachers selected to apply the treatments were first oriented to the four patterns of teacher behaviour. They were explained the meaning of each pattern in terms of their behaviour and also in terms of expected pupil behaviour. The differences between the four treatments were explained in terms of their solicitation and responding behaviour as well as the way to deal with pupil response behaviour. They were given one week's time to go through the content and prepare themselves for teaching. The patterns were also explained to them in terms of Flanders Interaction Analysis Category System (FIACS).

They were taken to actual classroom situations for practice in producing the treatment behaviours. 'Teach-Discussion-Reteach' pattern was followed for training these teachers.

When a teacher was teaching through a particular pattern, the other two teachers and the investigator observed that teacher. At the end of one period of teaching, discussion for half an hour was held within this group of four to find out the deviations from the plan or other difficulties felt by the teacher. The reteach session for that teacher was to be held on the next day. They were asked to stick to the fixed time limit for the completion of unit. In this way, they were given practice in all the four patterns.

The total programme of training extended over a period of twelve days (about fifty-two hours).

After training and before starting the actual experiment according to the design, these three teachers were asked to teach in classes other than those covered for training purposes or those to be included in the experiment. It required twelve classes of VII grade. These classes were taken from municipal corporation schools of Baroda City. Each teacher taught for sixty minutes in four classes—one class per pattern, for further validation of the training according to the patterns. FIACS matrices were prepared for these twelve ' sixty minutes ' teaching periods. They were compared for each pattern per teacher in terms of sequence of behaviour and time devoted to teacher talk, pupil participation, and feedback given.

Sample

The experiment necessitated forty-eight independent classrooms. The student sample was drawn from the VII grade of municipal corporation schools of Baroda City. The medium of instruction in all these classes was the regional language—Gujarati. The municipal corporation schools of Baroda City could be divided into three categories on the basis of class composition—sexwise, namely, girls' schools, boys' schools and co-educational schools.

The sample for the present study was limited to only boys' and girls' classes, and co-educational classes were exempted because of small number of pupils in such classes. There were about seventy-five classes for boys and girls. Out of these, twelve classes had already been covered for checking the validity of the training. The selection was done at random out of the remaining classes. For the final experiment forty-eight classes were taken up. No deliberate attempt was made to equate the number of classes of boys and girls. These classes were further assigned at random to three teachers for teaching in four patterns. Table 2 gives in tabular form, the assignment of classes, patternwise and sexwise to all the three teachers, along with the number of pupils in each class which were taken up for analysis purpose. The pupils who were not present for the entire period of data collection were dropped.

TABLE 2

Statement of the Sample According to the Design of the Study

	T_1		T_2		T_3	
	B	*G*	*B*	*G*	*B*	*G*
P_1	15	—	—	18	22	—
	14	—	—	18	—	21
	19	—	19	—	—	23
	—	17	—	14	—	39
P_2	19	—	16	—	—	23
	—	23	23	—	—	12
	21	—	—	23	—	16
	10	—	—	24	—	25
P_3	—	30	12	—	10	—
	—	32	25	—	14	—
	18	—	—	34	—	14
	23	—	15	—	—	19
P_4	19	—	18	—	—	21
	22	—	26	—	—	11
	23	—	—	25	—	22
	—	35	13	—	—	18

Note:—P = Pattern of Teaching; T = Teacher; B = Boys
G = Girls

The total sample of 973 as covered by the study consisted of 416 boys and 557 girls.

Instrumentation

The study involved the use of four tools, namely, (i) Flanders Interaction Analysis Category System (FIACS), (ii) The Desai-Bhatt Group Test of Intelligence, (iii) Pre-test of achievement in History for VII grade, constructed and standardised by Jhaveri (1970), (iv) Post-treatment test of achievement in History for the selected unit which was specially constructed for the purpose by the investigator. As the first three are standardised instruments, it is necessary to give details only of the fourth instrument.

The Post-Treatment Achievement Test

A panel consisting of the experienced teacher educators in history and school teachers teaching history was approached to assign weightage to these three objectives. Table 3 shows the weightage fixed for the three objectives.

TABLE 3

Weightage Assigned to Different Objectives by the Panel

Objectives	*Members of the Panel*					*Mean*
	1	2	3	4	5	%
Knowledge	47	54	62	47	50	52
Comprehension	35	30	27	35	38	33
Application	18	16	11	18	12	15
Total	100	100	100	100	100	100

On the basis of the weightage assigned to the objectives as mentioned in Table 3, fifty multiple choice items were initially constructed for the purpose. They were scrutinised by the panel for language and content and finally only thirty-three items were retained according to the weightage assigned. The split-half reliability of this test was found to be .92. Table 4 shows the distribution of items in the final test for each instructional objective.

TABLE 4

Distribution of the Items in the Final Form of Post-Treatment Achievement Test

Objectives	*Items*	*Total*	*Percentage distribution*
Knowledge	2 to 11 and 27 to 33	17	51.52
Comprehension	1 and 12 to 21	11	33.33
Application	22 to 26	5	15.15
	Total	33	100.00

The final test comprises thirty-three items and normally requires twenty minutes. No rigid time limit has been fixed for the test.

Data Collection

After the preparation and collection of the necessary tools for pre-treatment and post-treatment testing and specifying the treatment conditions, the data were collected from the selected forty-eight VII grade classes.

Statistical Techniques used

Different statistical techniques were employed for analysing the data to test the hypotheses. They were:

(i) Descriptive statistics in terms of central tendency and dispersion
(ii) Product-moment correlation
(iii) Analysis of variance and covariance
(iv) Student t-test technique.

Results

The data for the two variables, namely, intelligence and pre-achievement and four criterion variables, namely, total attainment and attainment in terms of knowledge, comprehension and application objectives were collected from subgroups under Pattern I (N = 239), Pattern II (N = 235), Pattern III (N = 246) and Pattern IV (N = 253) yielding a total sample of 973 of VII grade pupils.

The t-ratios were calculated in order to see whether the subgroups differ significantly as far as the variables of intelligence and pre-achievement are concerned. It was found that there were significant mean differences, with regard to intelligence, between subgroups under Pattern II and Pattern IV. There were significant mean differences between the subgroups under the Patterns I and II, and Patterns I and IV, in pre-achievement. This necessitated the adjustment of post-treatment scores based upon initial level of intelligence and pre-achievement.

The intercorrelations (product-moment correlation) amongst the variables were worked out to see from a correlational approach whether the variables namely, intelligence and pre-achievement share some common variance with the criterion variables. In case of significant relationship between these two sets of variables coupled with varying level of variables of intelligence and pre-achievement between subgroups, it became necessary to adjust the final criterion scores for the influence of initial differences in intelligence and pre-achievement scores. The correlations were calculated for all the four subgroups as well as for the total sample. In general, three statements can be made based upon the study of these intercorrelations. Firstly, the relationship between the two variables, namely, intelligence and pre-achievement was low. Secondly, the relationships between the variables of intelligence and pre-achievement and criterion variables were found to be either not significant or low. Thirdly, the relationships within the set of criterion variables were positive and significant in general, except for the variable namely, application objective.

Three-way analysis of variance was applied to get information about the interactional effect and also the effect of two variables of intelligence and pre-achievement and treatment patterns. The equal homogeneity of variance within the experimental sets was tested with the help of Bartlett's test of homogeneity. The results indicate that all the three variables have significant influence upon the criterion variables.

One analysis of covariance was applied in order to have uncontaminated results for the effect of treatment Patterns I, II, III and IV on the criterion variables of total attainment in terms of knowledge, comprehension and application. The two independent variables of intelligence and pre-achievement, taken with each of the criterion variables, resulted into eight studies of analysis of covariance. From the subgroups and/or each treatment, twenty cases were selected randomly using the random tables for analysis purpose. The results in the form of analysis of variance and covariance, adjusted means, differences amongst adjusted means for each of the eight covariance studies are given in Tables 5 to 12.

Since the aim of this study is to see the uncontaminated effect of treatment variables on attainment, it becomes necessary, as shown by the above presentation of results that the criterion scores should be adjusted for the initial differences in intelligence and pre-achievement. This necessitated the treatment of analysis of covariance.

Tables 5 to 8 comprise the results for the criterion measures of total attainment and attainment in terms of knowledge, comprehension and application under treatment patterns I, II. III and IV. The scores of the criterion measures were adjusted for the initial differences in intelligence among pupils under different subgroups. The significance of differences amongst the adjusted mean scores for the different treatments finally tested with the help of 't' test.

TABLE 5

Adjustment of the Mean Criterion Score of Total Attainment (T) for Initial Differences in Intelligence (I) (X = Scores of I, Y = Scores of T)

Analysis of Variance

Sources of variation	*df*	SS_x	SS_y	$MS_x\,(V_x)$	$MSy\,(V_y)$	F_x	F_y
Among Means	3	341.650	213.250	113.883	71.083	1.936	2.962
Within Groups	76	4469.900	1823.500	58.814	23.993		
Total	79	4811.550	2036.750				

Analysis of Covariance

Sources of variation	*df*	SS_x	SS_y	$S_{x \cdot y}$	$SS_{y \cdot x}$	$MS_{y \cdot x}\,(V_{y \cdot x})$	$SD_{y \cdot x}$	$F_{y \cdot x}$
Among Means	3	341.650	213.250	42.650	208.086	69.362	4.797	3.013
Within Groups	75	4469.900	1823.500	658.600	1726.461	23.019		
Total	78	4811.550	2036.750	701.250	1934.547			

TABLE 5 (Contd.)

Calculation of Adjusted Y Means

Groups	*N*	M_x	M_y	$M_{y \cdot x}$ (*Adjusted*)
1 (P_1)	20	82.350	17.200	17.454
2 (P_2)	20	87.550	18.400	17.887
3 (P_3)	20	83.700	21.350	21.405
4 (P_4)	20	82.700	17.550	17.752

Differences between Adjusted Means

$P_1 - P_2 = 0.433$ $P_1 - P_3 = 3.951^*$ $P_1 - P_4 = 0.298$

$P_2 - P_3 = 3.518^*$ $P_2 - P_4 = 0.135$ $P_3 - P_4 = 3.653^*$

* Significant at .05 level

TABLE 6

Adjustment of the Mean Criterion Score of Attainment in Terms of Knowledge Objective (K) for Initial Differences in Intelligence (I) (X = Scores of I, Y = Scores of K)

Analysis of Variance

Sources of variation	*df*	SS_x	SS_y	MS_x (V_x)	MS_y (V_y)	F_x	F_y
Among Means	3	341.650	87.250	113.883	29.083	1.936	3.033
Within Groups	76	4469.900	728.700	58.814	9.588		
Total	79	4811.550	815.950				

Analysis of Covariance

Sources of variation	*df*	SS_x	SS_y	$S_{x\cdot y}$	$SS_{y\cdot x}$	$MS_{y\cdot x}$ ($V_{y\cdot x}$)	$SD_{y\cdot x}$	$F_{y\cdot x}$
Among Means	3	341.650	87.250	47.600	81.059	27.419	3.015	2.970
Within Groups	75	4469.900	728.700	456.050	682.170	9.095		
Total	78	4811.550	815.950	503.650	763.229			

TABLE 6 (Contd.)

Calculation of Adjusted Y Means

Groups	*N*	M_x	M_y	$M_{y \cdot x}$ (*Adjusted*)
1 (P_1)	20	82.350	4.650	10.925
2 (P_2)	20	87.550	4.850	11.449
3 (P_3)	20	83.700	6.100	13.438
4 (P_4)	20	82.700	4.750	11.092

Differences between Adjusted Means

$P_1 - P_2 = 0.524$ $P_1 - P_3 = 2.513^{**}$ $P_1 - P_4 = 0.167$

$P_2 - P_3 = 1.989^{*}$ $P_2 - P_4 = 0.357$ $P_3 - P_4 = 2.346^{*}$

** Significant at .01 level * Significant at ,05 level

TABLE 7

Adjustment of the Mean Criterion Score of Attainment in Terms of Comprehension Objective (C) for Initial Differences in Intelligence (I) (X = Scores of I, Y = Scores of C)

Analysis of Variance

Sources of variation	*df*	SS_x	SS_y	$MS_x(V_x)$	$MS_y(V_y)$	F_x	F_y
Among Means	3	341.650	27.737	113.883	9.245	1.936	2.337
Within Groups	76	4469.900	300.650	58.814	3.955		
Total	79	4811.550	328.387				

Analysis of Covariance

Sources of variation	*df*	SS_x	SS_y	$S_{x \cdot y}$	$SS_{y \cdot x}$	$MS_{y \cdot x}(V_{y \cdot x})$	$SD_{y \cdot x}$	$F_{y \cdot x}$
Among Means	3	341.650	27.737	0.275	28.064	9.354	1.985	2.371
Within Groups	75	4469.900	300.650	147.200	295.802	3.944		
Total	78	4811.550	328.387	147.475	323.866			

TABLE 7 (Contd.)

Calculation of Adjusted Y Means

Groups	*N*	M_x	M_y	$M_{y \cdot x}$ (*Adjusted*)
1 (P_1)	20	82.350	4.650	4.706
2 (P_2)	20	87.550	4.850	4.735
3 (P_3)	20	83.700	6.100	6.112
4 (P_4)	20	82.700	4.750	4.795

Differences between Adjusted Means

$P_1 - P_2 = 0.029$

$P_1 - P_3 = 1.406^*$

$P_1 - P_4 = 0.089$

$P_2 - P_3 = 1.377^*$

$P_2 - P_4 = 0.060$

$P_3 - P_4 = 1.317^*$

* Significant at .05 level

TABLE 8

Adjustment of the Mean Criterion Score of Attainment in Terms of Application Objective (A) for Initial Differences in Intelligence (I) (X = Score of I, Y = Score of A)

Analysis of variance

Sources of variation	*df*	SS_x	SS_y	$MS_x\,(V_x)$	$MS_y\,(V_y)$	F_x	F_y
Among Means	3	341.650	000.137	113.883	0.045	1.936	0.029
Within Groups	76	4469.900	118.050	58.814	1.553		
Total	79	4811.550	118.187				

Analysis of Covariance

Sources of variation	*df*	SS_x	SS_y	$S_{x\cdot y}$	$SS_{y\cdot x}$	$MS_{y\cdot x}\,(V_{y\cdot x})$	$SD_{y\cdot x}$	$F_{y\cdot x}$
Among Means	3	341.650	000.137	–5.225	000.300	0.100	1.250	0.64
Within Groups	75	4469.900	118.050	55.350	117.364	1.565		
Total	78	4811.550	118.187	50.125	117.664			

TABLE 8 (Contd.)

Calculation of Adjusted Y Means

Group	*N*	M_x	M_y	$M_{y \cdot x}$ *(Adjusted)*
1 (P_1)	20	82.350	1.800	1.821
2 (P_2)	20	87.550	1.750	1.706
3 (P_3)	20	83.700	1.850	1.854
4 (P_4)	20	82.700	1.850	1.867

Differences between Adjusted Means

$P_1 - P_2 = .115$

$P_2 - P_3 = .048$

$P_1 - P_3 = .033$

$P_2 - P_4 = .161$

$P_1 - P_4 = .046$

$P_3 - P_4 = .013$

According to Table 5, the treatment of Pattern III resulted into the highest adjusted mean scores (21.405) of total attainment which is significantly higher at .05 level, than the mean values of Pattern I (17.454), Pattern II (17.887) and Pattern IV (17.752). Table 6 shows that treatment of Pattern III resulted into the highest adjusted mean scores (13.438) of attainment in terms of knowledge objective, which is significantly higher at .01 level, than the mean value of Pattern I (10.925) and at .05 level than the mean values of Pattern II (11.445) and Pattern IV (11.092). In the case of attainment in terms of comprehension objective (Table 7) again the mean value after treatment of Pattern III comes out to be significantly higher at .05 level, than those of Pattern I (4.706), Pattern II (4.735) and Pattern IV (4.795). However, no significant differences are found amongst the treatments as far as the attainment in terms of application objective is concerned (Table 8).

Tables 9 to 12 present the results of the analysis of covariance for the criterion measures of total attainment and attainment in terms of knowledge, comprehension and application objectives adjusted for the initial differences in pre-achievement.

The procedural steps are same as those followed for the adjustment of criterion scores for the effects of intelligence. Table 9 reveals that the mean of total attainment scores after treatment of Pattern III (21.993) is significantly greater at .01 level, than those for Patterns I, II and IV (17.283, 18.058, and 17.163 respectively), even after adjusting them for the initial differences in pre-achievement. From Table 10 it is evident that the mean score of attainment in terms of knowledge objective after treatment due to Pattern III (13.744) is significantly higher (at .01 level) than those due to Pattern I (10.644) and Pattern IV (10.743) and greater (at .05 level) than that due to Pattern II (11.617). The above results are obtained after adjusting the mean scores for initial differences in pre-achievement. Table 11 shows that Pattern III again is responsible for getting the adjusted mean score of attainment in terms of

TABLE 9

Adjusment of the Mean Criterion Score of Total Attainment (T) for Initial Differences in Pre-Achievement (PA) (X = Scores of PA, Y = Scores of T)

Analysis of Variance

Sources of variation	*df*	SS_x	SS_y	$MS_x\,(V_x)$	$MS_y\,(V_y)$	F_x	F_y
Among Means	3	68.537	213.250	22.845	71.083	1.992	2.62
Within Groups	76	871.350	1823.500	11.465	23.993		
Total	79	939.887	2036.750				

Analysis of Covariance

Sources of variation	*df*	SS_x	SS_y	$S_{x \cdot y}$	$SS_{y \cdot x}$	$MS_{y \cdot x}\,(V_{y \cdot x})$	$SD_{y \cdot x}$	$F_{y \cdot x}$
Among Means	3	68.537	213.250	–94.975	295.226	98.408	4.688	4.476
Within Groups	75	871.350	1823.500	390.100	1648.853	21.984		
Total	78	939.887	2036.750	295.125	1944.079			

TABLE 9 (Contd.)

Calculation of Adjusted Y Means

Group	*N*	M_x	M_y	$M_{y \cdot x}$ (*Adjusted*)
1 (P_1)	20	9.350	17.200	17.283
2 (P_2)	20	10.300	18.400	18.058
3 (P_3)	20	8.100	21.350	21.993
4 (P_4)	20	10.400	17.550	17.163

Differences between Adjusted Means

$P_1 - P_2 = 0.775$

$P_1 - P_3 = 4.710^{**}$

$P_1 - P_4 = 0.120$

$P_2 - P_3 = 3.935^{**}$

$P_2 - P_4 = 0.895$

$P_3 - P_4 = 4.830^{**}$

** Significant at .01 level

TABLE 10

Adjustment of the Mean Criterion Score of Attainment in Terms of Knowledge Objective (K) for Initial Differences in Pre-Achievement (PA) (X = Scores of PA, Y = Scores of K)

Analysis of variance

Sources of variation	*df*	SS_x	SS_y	$MS_x(V_x)$	$MS_y(V_y)$	F_x	F_y
Among Means	3	68.537	93.438	22.845	31.146	1.992	3.325
Within Groups	76	871.350	711.750	11.465	9.365		
Total	79	939.887	805.188				

Analysis of Covariance

Sources of variation	*df*	SS_x	SS_y	$S_{x \cdot y}$	$SS_{y \cdot x}$	$MS_{y \cdot x}(V_{y \cdot x})$	$SD_{y \cdot x}$	$F_{y \cdot x}$
Among Means	3	68.537	93.438	–56.162	118.653	39.551	2.970	4.482
Within Groups	75	871.350	711.750	208.600	661.811	8.824		
Total	78	939.887	805.188	152.438	780.464			

TABLE 10 (Contd.)

Calculation of Adjusted Y Means

Groups	*N*	M_x	M_y	$M_{y \cdot x}$ *(Adjusted)*
1 (P_1)	20	9.350	10.600	10.644
2 (P_2)	20	10.300	11.800	11.617
3 (P_3)	20	8.100	13.400	13.744
4 (P_4)	20	10.400	10.950	10.743

Differences between Adjusted Means

$P_1 — P_2 = 0.973$ $P_1 — P_3 = 3.100$** $P_1 — P_4 = 0.099$

$P_2 — P_3 = 2.027$* $P_2 — P_4 = 0.874$ $P_3 — P_4 = 3.001$**

** Significant at .01 level * Significant at .05 level

TABLE 11

Adjustment of the Mean Criterion Score of Attainment in Terms of Comprehension Objective (C) for Initial Differences in Pre-Achievement (PA) (X = Scores of PA, Y = Scores of C)

Analysis of Variance

Sources of variation	*df*	SS_x	SS_y	$MS_x\ (V_x)$	$MS_y\ (V_y)$	F_x	F_y
Among Means	3	68.537	26.900	22.843	8.966	1.992	2.254
Within Groups	76	871.350	302.300	11.465	3.977		
Total	79	939.887	329.200				

Analysis of Covariance

Sources of variation	*df*	SS_x	SS_y	$S_{x \cdot y}$	$SS_{y \cdot x}$	$MS_{y \cdot x}\ (V_{y \cdot x})$	$SD_{y \cdot x}$	$F_{y \cdot x}$
Among Means	3	68.537	26.900	–37.1	35.503	11.834	1.957	3.089
Within Groups	75	871.350	302.300	113.8	287.437	3.832		
Total	78	939.887	329.200	76.7	322.940			

TABLE 11 (Contd.)

Calculation of Adjusted Y Means

Groups	*N*	M_x	M_y	$M_{y \cdot x}$ (*Adjusted*)
1 (P_1)	20	9.350	4.700	4.724
2 (P_2)	20	10.300	4.850	4.750
3 (P_3)	20	8.100	6.100	6.287
4 (P_4)	20	10.400	4.750	4.637

Differences between Adjusted Means

$P_1 - P_2 = 0.026$ $P_1 - P_3 = 1.563^*$ $P_1 - P_4 = 0.087$

$P_2 - P_3 = 1.537^*$ $P_2 - P_4 = 0.113$ $P_3 - P_4 = 1.650^{**}$

* Significant at .05 level ** Singnificant at .01 level

TABLE 12

Adjustment of the Mean Criterion Score of Attainment of Application Objective (A) in Terms of Initial Differences in Pre-Achievement (PA) (X = Scores of PA, Y = Scores of A)

Analysis of Variance

Sources of variation	*df*	SS_x	SS_y	$MS_x\ (V_x)$	$MS_y\ (V_y)$	F_x	F_y
Among Means	3	68.537	000.437	22.845	0.145	1.992	0.93
Within groups	76	871.350	119.050	11.465	1.566		
Total	79	939.887	119.487				

Analysis of Covariance

Sources of variation	*df*	SS_x	SS_y	$S_{x \cdot y}$	$SS_{y \cdot x}$	$MS_{y \cdot x}\ (V_{y \cdot x})$	$SD_{y \cdot x}$	$F_{y \cdot x}$
Among Means	3	68.537	000.437	–4.587	1.540	0.513	1.228	.340
Within Groups	75	871.350	119.050	71.500	113.182	1.509		
Total	78	939.887	119.487	66.913	114.722			

TABLE 12 (Contd.)

Calculation Adjusted Y Means:

Groups	N	M_x	M_y	$M_{y \cdot x}$ (*Adjusted*)
1 (P_1)	20	9.350	1.900	1.915
2 (P_2)	20	10.300	1.750	1.687
3 (P_3)	20	8.100	1.950	2.067
4 (P_4)	20	10.400	1.850	1.779

Differences between Adjusted Means

$P_1 - P_2 = 0.228$ $P_1 - P_3 = 0.152$ $P_1 - P_4 = 0.136$

$P_2 - P_3 = 0.380$ $P_2 - P_4 = 0.092$ $P_3 - P_4 = 0.288$

comprehension objective (6.287) adjusted for initial differences in pre-achievement, is significantly greater (at .01 level) than those due to Pattern I (4.724) and Pattern II (4.750) and greater (at .05 level) than that due to Pattern IV (4.637). Table 12 reveals that none of the differences between means of scores of attainment, in terms of application objective, adjusted for initial differences in pre-achievement is significant.

The hypotheses of the study are discussed below keeping in mind the results after adjusting the criterion scores for both intelligence (Tables 5 to 8) and preachievement (Tables 9 to 12).

The hypothesis I implied that the attainment of knowledge objective would remain the same, irrespective of the four patterns of teaching behaviour. It has been found that Pattern III comes out to be the most effective pattern of teaching behaviour as compared to other patterns as far as the knowledge objective is concerned. This is evident from the significantly higher adjusted mean criterion score for Pattern III than the adjusted mean scores for the other patterns. The null hypothesis is not accepted. One of the patterns is found to be more effective than the other patterns.

The hypothesis II implied that Pattern I is not effective when the teacher aims at developing comprehension and application. Pattern I is only narration, equivalent to teacher's lecturing to the students, without their involvement. The rationale for the hypothesis, already discussed, is that when higher objectives of learning are aimed at, only lecturing by teachers would not help. The results of the experiment that are discussed earlier partially support the hypothesis. This implies that where comprehension objective is concerned Pattern I is less effective than patterns II, III and IV. Pattern III is found to be the most effective in the case of comprehension as also for knowledge. When the adjusted mean criterion scores are studied in case of the application objective, no significant difference is found across the four patterns. One cannot say on the basis of the present experiment which pattern is more effective and which pattern is less effective as far as the application objective is concerned.

The hypothesis III is again not supported. Pattern II does not yield any significant higher adjusted mean score in case of application objective. In fact, there is no pattern from amongst the four patterns selected in the present experiment which is associated with a higher attainment for the application objective.

Summarising the above results, it can be said that treatment of Pattern III is the most effective for increasing pupils' total attainment and attainment in terms of knowledge and comprehension objectives. The treatments could not be differentiated as far as the attainment of application objective is concerned.

Some Inferences

The inferences that can be drawn from the present study are :

1. Some participation of pupils in the classroom discourse is important than either no participation or comparatively more participation.
2. Narrow questions are more effective than open questions as far as the attainment of knowledge and comprehension objectives are concerned.
3. In the context of the present study, feedback by teachers does not appear to play an important role.

All the three inferences are being discussed one by one under the following captions :

Participation of Pupils :

The first inference refers to a comparison between pupil participation and no participation. The first pattern provides for a variable of no participation. The ineffectiveness of the first pattern renders a point in favour of pupil participation. The next question is how much of this participation? In the case of this study, this question is being answered by Pattern II on one side and Patterns III and IV on the other. Pattern II provides for open questions which involve more time of pupil talk as against narrow questions of Patterns III and IV.

Here a limited amount of pupil participation (narrow questions—Pattern III) has been found to be comparatively more important.

If one goes back to pupil participation studies done in the past, one finds an inconsistency among the results of such researches (Furst, 1967; Sharp, 1966; Soar, 1966; Wright and Nuthall, 1970, on one hand using observation system and Fortune, Gage and Shutes, 1966; Solomon, Bezdek and Rosenberg, 1964 and Torrance and Parent, 1966 on the other using ratings as the measures of amount of pupil participation). In the case of the studies using observation system, the correlation between student talk and pupil achievement ranged from –.07 to .25 and all being non-significant. In the case of rating studies, this range was from –.06 to +.24. Only in the study by Torrance and Parent (1966), the student variables of finding errors or defects in classmates' solutions and pupils suggesting new or improved ways of class working had t-ratios of –3.08 and –2.08 significant at .01 and .05 levels respectively. However, Church (1971) also attempted to study the amount of pupil participation. He concluded, " From the results.... it would appear that questions are very important in prompting pupil learning, while the participation studies suggest that actually answering those questions may not matter too much ".

This comment of Church (1971) can be better understood when the types of questions are compared.

Narrow Questions vs. Open Questions

In this study, narrow questions have been proved to be more effective in the attainment of knowledge and comprehension objectives.

Here, the questions have been classified into two types, namely, narrow-highly specified, and open-less highly specified questions. Many other studies have been conducted with this bifurcation of questions.

Of the seven investigations in which questions were classified into two types, only three investigations reported significant results. In Kleinman's study (1964) the high achieving teachers asked more high level questions. In Spaulding's study (1965), they asked fewer open ended questions and in a study by Thompson and Bowers (1968), the highest achieving teachers mixed convergent and divergent questions. In a study by Church (1971) whose operational definitions of 'closed' and 'open' questions are near to the operational definitions of this study, it was found that when questions were directed to similar pupils, the increase in the proportion of open questions resulted in a decrease in the proportion of pupil answers accepted by teachers. The lower proportion of correct answers did not result in less learning. He is of the opinion that these two types of questions might be having certain optimum levels and that they may differ according to the objectives of the teacher. Francis (1971) argues that open questions are valuable in helping to raise the level of pupil thought. However, Church (1971) suggests, "when the objective is pupil understanding and retention, the virtues of the challenge posed by open questions are outweighed by the detrimental effects of their vagueness...." This suggestion of Church (1971) is validated by the findings of the present study where Pattern III—narrow questions is found to be more effective in the realization of knowledge and comprehension objectives which are parallel to the retention and understanding of Church (1971).

Amount of Feedback

In terms of teacher reaction to pupil responses, a variation in the amount and nature of feedback has been created either by the total absence of any type of feedback or a well planned and restricted feedback. Pattern III provides for 'No comment' (pupils' answers followed immediately by another question) while Patterns II and IV provide for a teachers' comment like 'good', repeating the answer, using it in her own talk or in case the answer is wrong giving corrective feedback. Here, it has been found that 'No comment' is more effective than a composite measure of all other types of feedback.

Many investigators have studied the effects of 'teacher use of pupil ideas' and 'direct and indirect ratios' on pupil achievement and they have found a positive trend in favour of these types of feedback.

Implications of the Present Study

The major implication of the present study is for those in charge of teacher education programmes. The programme of teacher education today is based more on the learning theories and laws of learning rather than on studies of teacher behaviour and theories of instruction. This is a major weakness in the programme of teacher education today. The teacher education has to be reshaped on the basis of the findings of empirical research in the area of teacher behaviour in classrooms. The immediate implication of the present study is that, teacher preparation should concentrate on developing skills for putting narrow specific questions amongst trainees. A word of caution is necessary here. This is the first study of its type in India and unless adequate research is undertaken on the validation of teacher behaviour it will be rather too early to disseminate these behaviours in teacher education programme. Any new innovation has to be based on research and not on faith. The only ideas which have been tested in the research crucible should be disseminated as innovations that are likely to result in improvement. Gone are the days, when innovations based upon opinions received more attention than innovations based on research findings. The present study does establish the effectiveness of a pattern of teaching behaviour based on narrow pointed questions as far as the attainment of knowledge and comprehension objectives is concerned. But the study is the first of its type. The present study can be a pace setter for a series of experiments in the area of teacher behaviour in the years to come. Institutions of teacher education would do well in undertaking studies in this area which require not large amount of money but a high level of imagination and deep thinking.

Suggestions for further Studies

This research has thrown out a number of problems demanding concentration by future researchers. No doubt, the present study has established the effectiveness of narrow questions over other three teaching patterns; it, however, remains to be established whether there are other patterns also, which are equally effective, if not more, than the Pattern III of this study in the domain of knowledge and comprehension attainment. Teaching is a dynamic process. As long as a live teacher is going to manage the instructional programme in the classroom, it has to be remembered that his teaching behaviour would be influenced by the behaviour of the pupils, size of the classroom, nature of the teaching unit and many other such factors. It is very necessary that different patterns of teaching behaviour, other than the four included in this study, are selected as treatment variables and their efficacy tested with respect to attainment of different instructional objectives.

The second suggestion for research is in the area of application objective. In India, since 1956, the development of application objective is being stressed. Hundreds of evaluation workshops organized all over the country have discussed the importance of application and have constructed items to measure application. In very few workshops, learning experiences necessary for the achievement of application objective, have been discussed. The present study is one of the very few studies available in the world and certainly the first of its type in India where efforts have been made to establish relationship between patterns of teaching behaviour and attainment of application objective. The success of the study lies in its failure to find out such a relationship. The four patterns have more or less the same effect on the attainment of application objective. Research studies have to be undertaken to identify teacher behaviour pattern or patterns associated with the effective attainment of this objective.

A third suggestion is the need for the replication of this study. If the results of this study are to be passed on to institutions of teacher preparation, the validity of the study has to be established through replications. Any replication of the study will have to take careful notice of (a) selecting the patterns, and (b) preparing the criterion test. A criticism is directed against studies of this type as the hierarchical nature of the instructional objectives is not considered. Future studies will have to be careful in dealing with this criticism through the use of valid application items and more rigorous statistical procedures.

It is hoped that the present study will encourage, stimulate and even provoke researchers to take up more and more studies in this area that has been challenging teacher education in the latter half of the twentieth century.

8

EFFECT OF FEEDBACK FROM DIFFERENT SOURCES ON THE CLASSROOM BEHAVIOUR OF STUDENT TEACHERS

Need

An effective teacher guides the learning activities of the children. A teacher as a professional, develops certain skills to use his knowledge to organise, encourage and assist the desired learning. As a teacher he helps pupils to learn, as a leader he interacts with children individually or group as a whole. In the process of interaction he influences the children. Children too, as a result of participating in classroom transactions, soon develop shared expectations about how a teacher will act, what kind of a person he is and how they like their class. These feelings and expectations colour the classroom behaviour giving rise to a certain kind of social and emotional atmosphere in the classroom that appears to be fairly consistent, once it is established (Flanders, 1964). But how much knowledge does a teacher have about the kind of influence he is exerting and the way he is exerting in the classroom? How much does he know about the way the students perceive his behaviour? How much control is he able to exert over his own behaviour in the classroom? How much knowledge does he have regarding the relationship between classroom interaction and teaching acts, so as to explain some of the variability in the chain of events? How much insight has he developed regarding his success, and what are the contributing factors towards this success?

This involves a careful study of a teacher's own behaviour by himself in a systematic way so that he may gain a deep insight into his own pattern of influence. As he gains insight into his behaviour, he becomes conscious about the directions

N. N. Pangotra

along which he is to change his behaviour, either because he is not achieving what he planned to achieve or he is not achieving what he wanted to achieve, incorporating the new insights that he developed in the process of improving conditions of learning for the pupils. But the question is : Do our teachers have these necessary skills? Do our teacher education programmes equip student teachers with those skills?

The answer to both of the questions posed above is, by and large, negative. There are plenty of evidences in research literature and reports of the commissions and committees on education in general and teacher education in particular, supporting the above assertion. The gap between theory and practice has become a universal ingredient in these reports. This reveals some real, serious, and disturbing limitations of the prevalent teacher education programmes. The way our teacher education programmes in general and student teaching programmes in particular are conceived and implemented leaves much to be desired. The difficulty of translating theory and principles of teaching imparted in teacher education colleges into classroom practice by the student teachers is the most challenging task that teacher educators face today.

The last decade has witnessed a breakthrough in student teaching experiences. The technique of interaction analysis developed by Flanders (1963a) to provide an objective and systematic feedback to the teachers about their classroom behaviour and the technique of microteaching developed by Allen, Dwight (1966) to develop skills in the teachers through intensive teaching feedback and reteach cycles have proved to be more effective than the conventional programmes of student teaching. A number of researchers have demonstrated the effectiveness of the approaches (Flanders, 1963b; Hough and Amidon, 1964a, 1964b; Amidon, 1966, 1967; Amidon and Powell, 1966; Simon, 1966; Hanny, 1967; and Hill, 1967).

The rationale of interaction analysis, as a means of behavioural change, is based on the principle of feedback. When the teachers know specifically what teaching behaviour they have to create in the classroom, when they are provided feedback about their actual teaching behaviour and when they analyse the planned and the actual classroom behaviour with a view to identifying the gap between the two, and when they are given a chance to reteach to fill in the gap, they are likely to modify their classroom behaviour patterns. Now the questions arise, as to what should be the source of feedback—a machine, a peer from his own group of teachers or a college supervisor in the case of pre-service training and what source will be comparatively more effective. The effect of source of feedback on the classroom behaviour of teachers need to be studied to increase effectiveness of the interaction analysis approach. The present study was designed in response to this need.

The Problem

The present problem envisages a study of the effect of the different sources of feedback on the classroom behaviour of student teachers during their student teaching programmes. The study covered self, *i.e.*, the student teacher himself, peers, *i.e.*, his fellow student teachers, the college supervisor, and external observers as different sources of feedback. Machines like tape recorders and video-tapes were not considered as they are beyond the reach of our schools. The classroom behaviour patterns, selected as the criterion measures, were obtained from the Flanders Interaction Analysis Category System (FIACS). These included the categories from 2 to 9, i/d Ratio, I/D Ratio, S/T Ratio, Flexibility, Steady Praise, Steady Acceptance and Use of Pupil Ideas, Positive Affective Teacher Talk, Negative Affective Teacher Talk, Instantaneous Teacher Response Ratio, Teacher Question Ratio, Instantaneous Teacher Question Ratio, Pupil Initiation Ratio and Extended Pupil Initiated Talk. The study is experimental in nature.

Design

The present study employed pretest, post-test and control group design to compare the effects of different forms of feedback on the measures of classroom behaviour of student teachers.

To this end, six groups of student teachers were constituted. The six treatments, for the corresponding six groups of student teachers, according to the respective treatments they received, may be described as under :

A1 Treatment group that made a self appraisal of teaching behaviour and had self-directed feedback for continual self-improvement.

A2 Treatment group that received feedback from the peers.

A3 Treatment group that got feedback from the college supervisor.

A4 Treatment group that got feedback from the external observer. In the present investigation a teacher of the practising school served as an external observer.

A5 A control group that was taught interaction process analysis.

A6 A control group that did not learn interaction process analysis, but learnt traditional learning theory.

Hypotheses

The following hypotheses were formulated for the present study :

(i) There will be no significant differences between the mean scores of the four experimental groups, *i.e.*,

$$H_o : M_{T_1} = M_{T_2} = M_{T_3} = M_{T_4}$$

(ii) There will be significant differences between the mean scores of the four experimental groups and two control groups. The alternate hypotheses tested are as follows:

$$H_1 : M_{T_1} > M_{T_5} \text{ and } M_{T_1} > M_{T_6}$$

$$M_{T_2} > M_{T_5} \text{ and } M_{T_2} > M_{T_6}$$

$$M_{T_3} > M_{T_5} \text{ and } M_{T_3} > M_{T_6}$$

$$M_{T_4} > M_{T_5} \text{ and } M_{T_4} > M_{T_6}$$

(iii) There will be significant differences between the mean gain scores of the six trials when averaged over six treatments, e.g.,

$$H_1 : M_{G_1} \neq M_{G_2} \neq M_{G_3} \neq M_{G_4} \neq M_{G_5} \neq M_{G_6}$$

Sample

A random sample of forty-eight women student teachers was drawn from a population of the B.Ed. unmarried women student teachers of a college of education. These student teachers had studied either History or Political science in their B.A. degree course. They had no professional qualification. Their age ranged from 21 to 23 years.

Tool Used

Flanders Interaction Analysis Category System (FIACS) described in chapter 2 of this book, was used for the purpose of observation of the classroom behaviour of student teachers.

Procedure

The forty-eight student teachers, selected for the present study, were randomly assigned to the six treatment groups A1, A2, A3, A4, A5 and A6. This was followed by the administration of treatments to the respective groups of student teachers.

In the feedback based on interaction analysis, the teachers ought to know the system to be followed; they should be able to select appropriate objectives in terms of teaching behaviour patterns they want to acquire; they need to master them during the 'skill sessions'; they need to collect data on their actual teaching behaviour, receive feedback and identify the gap between their anticipated classroom behaviour and the actual classroom behaviour and reteach to bridge the gap between anticipated and the actual classroom behaviour. To achieve this end in the present study, the groups of student teachers, namely, A1, A2, A3, A4 and A5 were familiarised with the procedure followed in interaction analysis using FIACS. This step, of course, was preceded by observation of the all the student teachers to get pretest scores, for which six observers were adequately trained in interaction analysis and had gained a coefficient of inter-observer reliability above .85 after Scott's coefficient of inter-observer agreement.

In the next phase, feedback was planned from different sources as indicated in the earlier section to the experimental groups, A1, A2, A3, and A4. The student teachers in these four experimental groups were observed for a period of twenty minutes' active interaction using FIACS. The 10 × 10 matrices were prepared and discussed with the groups, A2, A3, and A4 by their respective supervisors. In group A1, each student teacher herself studied the matrix and got feedback. No information regarding the form of interaction analysis matrices was provided to the control groups A5 and A6. Six such sessions, spread over a period of four weeks, were organised for each group as below :

Two sessions during the first week of practice in teaching.
Two sessions during the second week of practice in teaching.
One session during the third week of practice in teaching.
One session during the fourth week of practice in teaching.

Statistical Analysis

The first step in the analysis of the data was to determine the algebraic gains of the twenty-one dependent variables by subtracting the pretest scores from each of the six post-test scores obtained after each session of feedback. Means and standard deviations were computed for the sets of trial gain scores for the dependent variables. In a number of cases the standard deviation was found to be larger than mean which suggested skewed distribution.

Application of Hartlay's F-max indicated the presence of serious departure of variance from homogeneity in case of the dependent variables. Since the principal method of analysis adopted was a repeated measure design for the analysis of variance, non-normality and heterogeneity of variances represent major violations of the assumptions on which the technique is based.

It was considered desirable to normalise the scores. In the present study raw gain scores were first converted to T-scores to remove the negative scores. This was followed by their normalisation through transformation to logarithmic scores. The logarithmic transformation was selected as Winer (1970) considers it to be the most appropriate for the data with the above characteristics.

Following the observation of significant values for the F-ratio, comparison between pairs of means was made using the Tukey Method and values for *q* were referred to the studentised probability range.

Results

The data have been analysed using the above statistical techniques, for all the twenty-one dependent variables of the study and presented in this section.

Tables 1 to 21 include the summaries of the results of analyses of variance for trial gain means with different treatments regarding each of the twenty-one dependent variables.

(*a*) *Praise or Encouragement* (*Category 2*)

TABLE 1

Summary of the Analysis of Variance for Trial Gain Means with Different Treatments Regarding the Variable 'Praise or Encouragement'

Source of variation	*Sum of Squares*	*df*	*Mean Square*	*F*
Between Subjects	**1.016**	**47**		
A (Treatments)	0.391	5	0.078	5.20**
Subjects within groups	0.625	42		
Within Subjects	**1.167**	**240**		
B (Trial Gains)	0.001	5	0.000	0.00
A × B (Treatments × Trial Gains)	0.141	25	0.006	1.20
B × Subjects within Groups	1.025	210	0.005	

** Significant at .01 level.

For the treatment effect the F-ratio is significant at .01 level. As the six treatment means of A1, A2, A3, A4, A5 and A6, correspond to a general overall measure of performance for each treatment, significance of the result implies that the overall measures of performance for the six treatments differ significantly. The overall measures of performance for the six trial gains effect, however, do not differ significantly as is evident from the non-significant F. The treatment × trial gains interaction is also not significant which implies that the learning curves of the six treatments are of the same form.

To test further the difference between pairs of treatment means, Tukey Method was employed. Mean performance of group A6 (1.638) comes out to be significantly different from the performance means of groups A3 and A4 (1.744 and 1.732, respectively). This suggests that the performances of the treatment groups receiving feedback from (a) college supervisor and (b) the external observer were better than the performance of the group which was not taught interaction analysis.

(*b*) *Acceptance and Use of Students' Ideas* (*Category* 3)

TABLE 2

Summary of the Analysis of Variance for Trial Gain Means with Different Treatments Regarding the Variable 'Acceptance and Use of Students' Ideas'

Source of variation	*Sum of Squares*	*df*	*Mean Square*	*F*
Between Subjects	**1.410**	**47**		
A (Treatments)	0.380	5	0.076	3.16*
Subjects within groups	1.030	42	0.024	
Within Subjects	**0.890**	**240**		
B (Trial Gains)	0.000	5	0.000	0.00
A × B (Treatment × Trial Gains)	0.153	25	0.006	2.00**
B × Subjects within Groups	0.737	210	0.003	

** Significant at .01 level * Significant at .05 level

The treatment differences are revealed to be significant at .05 level. This suggests that the overall measures of performance for the six treatments differ significantly at .05 level and that the hypothesis of significant differences between the mean scores of the treatment groups cannot be rejected. The differences between the six trial gain means are not found to be significant. The treatment × trial interaction, however, is found to be significant which suggests that the learning curves under the six treatments are not of the same form.

Tukey-tests reveal that the mean performance of group A5 (1.648) is significantly different from the performance means of the groups A1 and A4 (1.742 and 1.736, respectively). In other words, the control group which was oriented to interaction analysis but not provided with feedback, differed significantly in the performance from the treatment groups which (a) made self appraisal of their individual behaviour, and (b) received feedback from the external supervisor. It suggests that the student teachers who made self appraisal of their individual classroom behaviour and those who were observed by an external observer, who presented objective information to the members of the group regarding their teaching behaviour and discussed steps for further improvement, attended more to pupil ideas and integrated them into the class discussion better than those of the control group who were taught interaction analysis but provided no feedback.

(*c*) *Asking Questions* (*Category* 4)

The table below (Table 3) gives the summary of analysis of variance for trial gain means with different treatments for the variable, namely, asking questions (category 4). It is revealed from the table that for the treatment effect (A), F = 1.38 with 5,42 *df* and it is not significant. This indicates that the overall measures of performance for the six treatments do not differ significantly. Regarding trial gain effect (B), it is found that the overall measures of performance for the six trial gains when averaged over the six treatments do not differ. For the treatment × trial gains interaction, F = 2.50 with 25,210 *df* and it is not a significant value. A significant A × B interaction would suggest that the learning curves of the six treatments are not parallel. They are of different forms.

TABLE 3

Summary of the Analysis of Variance for Trial Gain Means with Different Treatments for the Variable 'Asking Questions'

Source of Variation	*Sum of Squares*	*df*	*Mean Square*	*F*
Between subjects	**1.045**	**47**		
A (Treatments)	0.143	5	0.029	1.38
Subjects within groups	0.902	42	0.021	
Within Subjects	**1.092**	**240**		
B (Trial Gains)	0.002	5	0.000	0.00
A × B (Treatment × Trial Gains)	0.251	25	0.010	2.50**
B × Subjects within Groups	0.839	210	0.004	

** Significant at .01 level.

(*d*) *Lecturing* (*Category* 5)

TABLE 4

Summary of the Analysis of Variance for Trial Gain Means with Different Treatments Regarding the Variable 'Lecturing'

Source of Variation	*Sum of Squares*	*df*	*Mean Square*	*F*
Between Subjects	**1.143**	**47**		
A (Treatments)	0.185	5	0.037	1.61
Subjects within groups	0.958	42	0.023	
Within Subjects	**1.334**	**240**		
B (Trial Gains)	0.000	5	0.000	0.00
A × B (Treatment × Trial Gains)	0.205	25	0.008	1.60*
B × Subjects within Groups	1.129	210	0.005	

* Significant at .05 level.

The F value reveals that the overall measures of performance for the six treatments do not differ significantly. The trial gains effect is also not significant which implies that the hypothesis asserting the significant differences between the mean scores of the trial gains is rejected. The treatment × trial gains interaction turns out to be significant at .05 level. A significant treatment × trial gains interaction suggests that the learning curves of the six treatments are not parallel.

(*e*) *Giving Directions* (*Category* 6)

TABLE 5

Summary of the Analysis of Variance for Trial Gain Means with Different Treatments Regarding the Variable 'Giving Directions'

Source of Variation	*Sum of Squares*	*df*	*Mean Square*	*F*
Between Subjects	**1.320**	**47**		
A (Treatments)	0.328	5	0.066	2.75*
Subjects within Groups	0.992	42	0.024	
Within Subjects	**1.050**	**240**		
B (Trial Gains)	0.001	5	0.000	0.00
A × B (Treatment × Trial Gains)	0.200	25	0.008	2.00**
B × Subjects within Groups	0.849	210	0.004	

** Significant at .01 level. * Significant at .05 level.

It is seen from the table that the overall measures of performance for the six treatments differ significantly. In the case of trial gains, the results are not significant. But the effect of the treatment × trial gains interaction is found to be significant, which implies that the learning curves of the six treatments are not of the same form.

Tukey-tests reveal significant differences between the means for the groups A4 and A5, and A4 and A6 (the performance means of A4, A5 and A6 are 1.645, 1.730 and 1.735, respectively).

In other words, the mean of the treatment group that received feedback from the external observer differs significantly in the use of category 6 from the means of the two control groups. The category 6 is used for statements which are intended to solicit compliance. A significant decrease in the use of this category by the treatment groups indicates that the student teachers of those groups gave fewer directions to the pupils to obey.

(*f*) *Criticizing and Justifying Authority* (*Category* 7)

TABLE 6

Summary of the Analysis of Variance for Trial Gain Means with Different Treatments Regarding the Variable 'Criticizing or Justifying Authority'

Source of Variation	*Sum of Squares*	*df*	*Mean Square*	*F*
Between Subjects	**2.421**	**47**		
A (Treatments)	0.172	5	0.034	0.63
Subjects within Groups	2.249	42	0.054	
Within Subjects	**0.796**	**240**		
B (Trial Gains)	0.003	5	0.001	0.50
A × B (Treatment × Trial Gains)	0.277	25	0.011	5.50**
B × Subjects within Groups	0.516	210	0.002	

** Significant at .01 level.

Neither differences between the mean scores of different treatments nor between trial gain means are significant. The treatment × trial gain interaction, however, is found to be significant at .01 level which implies that the learning curves of six treatments are not of the same form.

(*g*) *Pupil Talk Response* (*Category* 8)

TABLE 7

Summary of the Analysis of Variance for Trial Gain Means with Different Treatments Regarding the Variable 'Pupil Talk Response'

Source of Variation	*Sum of Squares*	*df*	*Mean Square*	*F*
Between Subjects	**1.128**	**47**		
A (Treatments)	0.141	5	0.028	1.17
Subjects within Groups	0.987	42	0.024	
Within Subjects	**1.009**	**240**		
B (Trial Gains)	0.000	5	0.000	0.00
A × B (Treatment × Trial Grains)	0.239	25	0.010	2.50**
B × Subjects within Groups	0.770	210	0.004	

** Significant at .01 level.

The differences between different treatments are not significant, which render the hypothesis of significant differences between mean scores of different treatments rejected. The effect of trial gains is also not significant. The hypothesis of significant differences between the trial gain means hence is rejected. The significant treatment × trial gain interaction, implies that the learning curves of the six treatments are not parallel.

(*h*) *Pupil Initiated Talk* (*Category* 9)

TABLE 8

Summary of the Analysis of Variance for Trial Gain Means with Different Treatments Regarding the Variable 'Pupil Initiated Talk'

Source of Variation	*Sum of Squares*	*df*	*Mean Square*	*F*
Between Subjects	**1.242**	**47**		
A (Treatments)	0.494	5	0.099	5.50**
Subjects within Groups	0.748	42	0.018	
Within Subjects	**1.125**	**240**		
B (Trial Gains)	0.000	5	0.000	0.00
A × B (Treatment × Trial Gains)	0.186	25	0.007	1.75*
B × Subjects within Groups	0.939	210	0.004	

** Significant at .01 level. * Significant at .05 level.

The significant F for the treatment effect indicates that the overall measures of performance for the six treatments differ significantly. The non-significant trial gains effect reveal that the overall measures of performance for the six treatments for six trial gains when averaged over the six treatments do not differ. The significant treatment × trial gains interaction suggest that the learning curves of the six treatments are of different forms.

Tukey tests reveal that the mean performance of group A1 (1.776) is significantly different from the mean performance of groups A2, A3, A5 and A6 (1.666, 1.646, 1.683 and 1.672, respectively) at .05 level. In other words, self appraisal of the teaching behaviour and self directed feedback is significantly better than:

(a) the feedback provided by the peer group;
(b) the feedback provided by the college supervisor;
(c) control group having been taught interaction analysis; and
(d) control group not having been taught interaction analysis.

The results on this variable are quite encouraging as they provide an index of product variable, *i.e.*, pupil initiation in classroom teaching.

(*i*) *Indirect-Direct Ratio* (*i/d*)

TABLE 9

Summary of the Analysis of Variance for Trial Gain Means with Different Treatments Regarding the Variable 'Indirect-Direct Ratio (i/d)'

Source of Variation	*Sum of Squares*	*df*	*Mean Square*	*F*
Between Subjects	**1.545**	**47**		
A (Treatments)	0.694	5	0.139	6.95**
Subjects within Groups	0.851	42	0.020	
Within Subjects	**0.740**	**240**		
B (Trial Gains)	0.000	5	0.000	0.00
A × B (Treatment × Trial Gains)	0.142	25	0.006	2.00**
B × Subjects within Groups	0.598	210	0.003	

** Significant at .01 level.

Overall measures of performance for six treatments are found to differ significantly as is evident from the significant F. The trial gain mean differences are, however, not found to be significant. Significant treatment × trial gains interaction indicates that the learning curves of the six treatments are not of the same form.

Tukey-tests yield significant results for the pairs of treatment groups A2 and A3, A3 and A5, A3 and A6, A4 and A5 and A4 and A6. This means that the (1) mean performance of the college supervisor treatment group (1.764) is significantly different from the mean performance of the peer group (1.667) and both the control groups (1.642 and 1.625, respectively), (2) mean performance of the external observer treatment group (1.731) is significantly different from the mean performance of both the control groups. In other words, it may be maintained that to develop favourable i/d Ratio, feedback from the college supervisor and the external observer is more effective.

(*j*) *Indirect-Direct Ratio (I/D)*

TABLE 10

Summary of the Analysis of Variance for Trial Gain Means with Different Treatments Regarding the Variable 'Indirect-Direct Ratio (I/D)'

Source of Variation	*Sum of Squares*	*df*	*Mean Square*	*F*
Between Subjects	**1.466**	**47**		
A (Treatments)	0.165	5	0.033	1.06
Subjects with Groups	1.301	42	0.031	
Within Subjects	**1.318**	**240**		
B (Trial Gains)	0.000	5	0.000	0.00
A × B (Treatment × Trial Gains)	0.264	25	0.011	2.04**
B × Subjects within Groups	1.054	210	0.005	

** Significant at .01 level.

F values for treatment effect and the trial gains effect are not found to be significant. The significant treatment × trial gains interaction suggests that the learning curves of the six treatments are of different forms.

(*k*) *Student-Teacher Talk Ratio* (*S/T*)

TABLE 11

Summary of the Analysis of Variance of Trial Gain Means with Different Treatments Regarding the Variable 'Student-Teacher Talk Ratio (S/T)'

Source of Variation	*Sum of Squares*	*df*	*Mean Square*	*F*
Between Subjects	**1.514**	**47**		
A (Treatments)	0.202	5	0.040	1.30
Subjects within Groups	1.312	42	0.031	
Within Subjects	**0.968**	**240**		
B (Trial Gains)	0.000	5	0.000	0.00
A × B (Treatment × Trial Gains)	0.153	25	0.006	1.50
B × Subjects within Groups	0.815	210	0.004	

None of the values of F is significant. This implies that there are no significant differences in treatment means, and trial gain means, and no significant interaction between the two.

(*l*) *Flexibility*

TABLE 12

Summary of the Analysis of Variance of Trial Gain Means with Different Treatments Regarding the Variable 'Flexibility'

Source of Variation	*Sum of Squares*	*df*	*Mean Square*	*F*
Between Subjects	**1.103**	**47**		
A × (Treatments)	0.153	5	0.003	1.50
Subjects within Groups	0.950	42	0.002	
Within Subjects	**1.259**	**240**		
B (Trial Gains)	0.000	5	0.000	0.00
A × B (Treatment × Trial Gains)	0.210	25	0.008	1.60*
B × Subjects within Groups	1.049	210	0.005	

* Significant at .05 level.

The non-significant F for treatment effect suggests that the overall measures of performance for the six treatments do not differ. The trial gain mean differences are also not significant. The significant F for treatment × trial gains interaction shows that the learning curves of the six treatments are not parallel.

(*m*) *Extended Praise* (2-2 *Cell*)

TABLE 13

Summary of the Analysis of Variance of Trial Gain Means with Different Treatments Regarding the Variable 'Extended Praise (2-2 Cell)'

Source of Variation	*Sum of Squares*	*df*	*Mean Square*	*F*
Between Subjects	**1.067**	**47**		
A (Treatments)	0.326	5	0.065	3.50**
Subjects within Groups	0.741	42	0.018	
Within Subjects	**1.033**	**240**		
B (Trial Gains)	0.000	5	0.000	0.00
A × B (Treatment × Trial Gains)	0.185	25	0.007	1.75*
B × Subjects within Groups	0.848	210	0.004	

** Significant at .01 level. * Significant at .05 level.

The treatment effect is significant at .01 level. So, the hypothesis of significant differences between the mean scores of the various treatments cannot be rejected. The trial gains effect is not found to be significant. But the treatment × trial gains interaction is significant at .05 level implying, thereby, that the learning curves of the six treatments are of different forms.

Tukey-tests reveal that the mean performance of group A5 is significantly different from the mean performance of the groups with the treatments A1 and A3. The directions of the differences are A1 > A5 and A3 > A5. Alternately, the mean of the control group trained in interaction analysis is significantly lower than the means of (a) the group receiving feedback from self-appraisal; and (b) the group receiving feedback from the college supervisor. The groups A1 and A3 made more use of the extended praise statements.

(*n*) *Extended Acceptance and Use of Students' Ideas* (3-3 *Cell*)

TABLE 14

Summary of Analysis of the Variance for Trial Gain Means with Different Treatments Regarding the Variable Extended Acceptance and Use of Students' Ideas (3-3 cell)

Source of Variation	*Sum of Squares*	*df*	*Mean Square*	*F*
Between Subjects	**1.349**	**47**		
A (Treatments)	0.451	5	0.090	4.29**
Subjects within Groups	0.898	42	0.021	
Within Subjects	**1.068**	**240**		
B (Trial Gains)	0.002	5	0.000	0.00
A × B (Treatment × Trial Gains)	0.151	25	0.006	1.50
B × Subjects within Groups	0.915	210	0.004	

** Significant at .01 level.

The significant treatment effect suggests that the overall measures of performance for the six treatments differ. The other two F values for the trial gain means and for interaction between treatment and trial gains are not significant.

Turkey-tests reveal that each of the performance means of groups A1, A3 and A4 is significantly different from the mean performance of group A5. This implies that the performance means of the (a) self appraisal and self directed feedback group, (b) college supervisor feedback group, (c) external observer feedback group are significantly different from the mean performance of the control group trained in interaction analysis.

(*o*) *Extended Indirect*

TABLE 15

Summary of the Analysis of Variance of Trial Gain Means with Different Treatments Regarding the Variable 'Extended Indirect'

Source of Variation	*Sum of Squares*	*df*	*Mean Square*	*F*
Between Subjects	**1.288**	**47**		
A (Treatments)	0.292	5	0.058	2.42
Subjects within Groups	0.996	42	0.024	
Within Subjects	**1.025**	**240**		
B (Trial Gains)	0.002	5	0.000	0.00
A × B (Treatment × Trial Gains)	0.264	25	0.010	2.50**
B × Subjects within Groups	0.759	210	0.004	

** Significant at .01 level.

The differences in the treatment effect are found to be not significant. Same is the case with trial gains effect. The treatment × trial gains interaction, however, turns out to be significant, which indicates that the learning curves of the six treatments are not parallel.

(*p*) *Extended Direct*

TABLE 16

Summary of the Analysis of Variance of Trial Gain Means with Different Treatments Regarding the Variable 'Extended Direct'

Source of Variation	*Sum of Squares*	*df*	*Mean Square*	*F*
Between Subjects	**2.725**	**47**		
A (Treatments)	0.665	5	0.133	2.71*
Subjects within Groups	2.060	42	0.049	
Within Subjects	**0.617**	**240**		
B (Trial Gains)	0.000	5	0.000	0.00
A × B (Treatment × Trial Gains)	0.125	25	0.005	2.50**
B × Subjects within Groups	0.492	210	0.002	

** Significant at .01 level. * Significant at .05 level.

The significant F for treatment effect implies that the six treatment means differ. The trial gain means are not found to be significantly different. The interaction between treatments and trial gains works out to be significant which suggests that the learning curves are not of the same form.

Turkey-tests reveal that the differences between the means for A2 and A3 and A3 and A5 to be significant. In other words, the feedback by the college supervisor is significantly different from the feedback provided by the peer and the group which received feedback from college supervisor is significantly different from the control group which was taught interaction analysis.

(q) *Instantaneous Teacher Response Ratio*

TABLE 17

Summary of the Analysis of Variance of Trial Gain Means with Different Treatments Regarding the Variable 'Instantaneous Teacher Response Ratio'

Source of Variation	*Sum of Squares*	*df*	*Mean Square*	*F*
Between Subjects	**1.103**	**47**		
A (Treatments)	0.123	5	0.025	1.09
B Subjects with in Groups	0.980	42	0.023	
Within Subjects	**0.812**	**240**		
B (Trial Gains)	0.002	5	0.000	0.00
A × B (Treatment × Trial Gains)	0.086	25	0.003	1.00
B × Subjects within Groups	0.724	210	0.003	

Since none of the values of F is significant, it is implied that there are no significant differences in treatment means, and trial gain means and the interaction between the two also is not significant.

(*r*) *Teacher Question Ratio*

TABLE 18

Summary of the Analysis of Variance of Trial Gain Means with Different Treatments Regarding the Variable 'Teacher Question Ratio'

Source of Variation	*Sum of Squares*	*df*	*Mean Square*	*F*
Between Subjects	**1.356**	**47**		
A (Treatments)	0.431	5	0.086	3.92**
Subjects within Groups	0.925	42	0.022	
Within Subjects	**0.988**	**240**		
B (Trial Gains)	0.000	5	0.000	0.00
A × B (Treatment × Trial Gains)	0.169	25	0.007	1.75*
B × Subjects within Groups	0.819	210	0.004	

** Significant at .01 level. * Significant at .05 level.

The treatment differences are found to be significant at .01 level. This implies that the overall measures of performance for the different treatments differ. The trial gain mean differences in different groups are not significant. The significant F for treatment × trial gains interaction suggests that the learning curves for six treatments are different and not parallel to each other.

(*s*) *Instantaneous Teacher Question Ratio*

TABLE 19

Summary of the Analysis of Variance of Trial Gain Means with Different Treatments Regarding the Variable 'Instantaneous Teacher Question Ratio'

Source of Variation	*Sum of Squares*	*df*	*Mean Square*	*F*
Between Subjects	**1.513**	**47**		
A (Treatments)	0.102	5	0.020	0.61
Subjects within Groups	1.410	42	0.033	
Within Subjects	**0.872**	**240**		
B (Trial Gains)	0.000	5	0.000	0.00
A × B (Treatment × Trial Gains)	0.108	25	0.004	1.00
B × Subjects within Groups	0.764	210	0.004	

As is evident from the table that none of the treatment differences is significant. The same is true with trial gain mean differences and interaction between the treatments and trial gains effect.

(*t*) *Extended Pupil Initiation* (9-9 *Cell*)

TABLE 20

Summary of Analysis of Variance of Trial Gains Means Different Treatments Regarding the Variable 'Extended Pupil Initiation (9-9 cell)'

Source of Variation	*Sum of Squares*	*df*	*Mean Square*	*F*
Between Subjects	**1.459**	**47**		
A (Treatments)	0.466	5	0.093	3.88**
Subjects within Groups	0.993	42	0.024	
Within Subjects	**1.009**	**240**		
B (Trial Gains)	0.000	5	0.000	0.00
A × B (Treatment × Trial Gains)	0.181	25	0.007	1.75*
B × Subjects within Groups	0.828	210	0.004	

** Significant at .01 level. * Significant at .05 level.

The table reveals that the overall measures of performance for the six treatments differ significantly at .01 level. But the trial gains effect is not significant which implies that the hypothesis regarding the significant differences between the means of trial gains, is rejected. With regard to the interaction effect of treatment and trial gains, the F value is significant at.05 level indicating that the learning curves for the six treatments are not parallel.

(*u*) *Pupil Initiative Ratio*

TABLE 21

Summary of the Analysis of Variance of Trial Gain Means with Different Treatments Regarding the Variable 'Pupil Initiative Ratio'

Source of Variation	*Sum of Squares*	*df*	*Mean Square*	*F*
Between Subjects	**1.410**	**47**		
A (Treatments)	0.443	5	0.089	3.87**
Subjects within Groups	0.967	42	0.023	
Within Subjects	**1.090**	**240**		
B (Trial Gains)	0.002	5	0.000	0.00
A × B (Treatment × Trial Gains)	0.096	25	0.004	0.08
B × Subjects within Groups	0.992	210	0.005	

** Significant at .01 level.

The significant F for treatment differences shows that the overall measures of performance for the six treatments differ significantly. The differences in the effect of trial gains are not significant. The non-significant F for treatment × trial gains interaction indicates that the learning curves for the six treatments are not of different form, but parallel to each other.

Turkey-tests reveal that the mean performance of group A1 is significantly different from the performance means of groups A2, A5 and A6. The group means show that the student teachers who made self appraisal of their teaching behaviour and independently decided for their continual self improvement achieved higher Pupil Initiative Ratio in their classes when their group was compared with the group of student teachers which received feedback from their peers.

Comparing the treatments, the interaction analysis groups (A1, A2, A3 and A4) of student teachers performed better on interaction variables than the control groups (A5 and A6). It seems that the self appraisal group of student teachers, who are concerned with continual self improvement, was better than the groups receiving feedback from other sources. Feedback from the peer was not found to be effective. Feedback from college supervisor and external observer also proved to be effective.

The findings of the study have implications both for student teachers as well as in-service teachers. Interaction analysis not only is helpful in understanding and learning the classroom transaction in the beginning stages, but it provides an effective way of supervision of student teaching, as well. The effectiveness of the self appraisal approach in the present study is quite encouraging for the in-service teachers. The only essential requirement is the arrangement, whereby, a fellow teacher, or for that matter, any other observer provides the observation data to the teacher. Observation by a fellow teacher will be more convenient. If there are two or more teachers trained in interaction analysis in an institution they can continue their self appraisal and continual self improvement project. They can conduct even the 'scientific inquiry' projects as suggested by Flanders (1970).

STATE INSTITUTE OF EDUCATION BANIPUR

9

INTERACTION ANALYSIS, MICRO TEACHING AND MODIFICATION OF TEACHER CLASSROOM BEHAVIOUR

Problem

The teaching practice programme, organized for student teachers in most of teacher education colleges and departments, seems vague and does not give the student teachers a precise idea of what is to be achieved by teaching practice. The teacher educators on their part are more eager to assess the overall effectiveness of a student teacher than help him in developing into an effective teacher. Approach is rather global. It is recognized that each bit of the teacher behaviour in the classroom has considerable influence on the students' minds. It is the teacher who is active in the classroom most of the time. The practice teaching programmes of the teacher training colleges have so far laid emphasis on the content and methodology aspects of teaching. Effectiveness of teaching is to be judged to the extent it has caused learning in child. The communication process of the teacher in the classroom has been found to be mainly responsible for the proper educational growth of the child, although he is also expected to direct the pupils in activities outside the classroom in order to enable them to make the necessary changes in their way of thinking and acting. Whatever may be the effort to change school practices, ultimately it comes down to the teacher's classroom behaviour, his teaching and the teacher pupil interaction. The verbal interaction between the teacher and the pupil creates the climate of freedom or restriction for the pupils in the classroom. Not much attention has been paid to studying and analyzing teacher's verbal behaviour. Since the teacher exerts a great deal of influence on the pupils, teacher's behaviour as an important

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variable in the dynamics of the classroom should attract the attention of teacher education colleges.

A number of techniques are being used currently in India as well as in other countries for the modification of human behaviour. Some of these techniques include T-Groups, role play, programmed learning, achievement motivation training, interaction analysis, microteaching, etc. These techniques have become the educational innovations in the training of teachers both at pre-service and in-service levels and have shown promising results in other countries.

Microteaching is relatively a new departure in teacher training, which was first developed at Stanford by Allen and his associates (Allen, 1966, 1969). The evidences of Kallenbach and Gall (1969), and Allen and Ryan (1969) demonstrate that microteaching with videotape is at least as effective as block practice teaching. Experiments at Ulster (Brown, 1971) suggest that microteaching is worth considering by a college or a department of education looking for a way of improving its programmes and measuring their effectiveness. Chudasama (1971), by using microteaching in student teaching programme as a measure of an experiment, found the technique useful in Indian conditions.

Since the last decade, some educational researchers have been trying to develop concepts in terms of which classroom interaction could be described. Attempts have been made to analyse interactions in a classroom. The advantage of classroom interaction analysis lies in the fact that its utility has been established as a training tool as well as a tool to measure classroom behaviour patterns in the studies of Pareek and Rao (1970a), Sharma (1972), Jangira (1973) and Pangotra (1973). Studies have indicated the effectiveness of interaction analysis in helping teachers to modify their teaching behaviour in the classroom. Some of these studies include those by Kirk (1964), Hough and Amidon (1964 a, 1964 b), Soar (1966), Furst (1967), Hough and Ober (1967), Bondi (1969), Buch and Santhanam (1970 b), Pareek and Rao (1971b), Sharma

(1972), Jangira (1973) and Pangotra (1973) which reported changes in teacher behaviour due to training and feedback.

Therefore, with a view to exploring the possibility, usability and the efficacy of microteaching and interaction analysis techniques in teacher training programme practised at secondary teacher training institutions, the present study was planned. The following were the objectives of the study.

Objectives

1. To study the effectiveness of microteaching vis-a-vis conventional method of training as a means of changing classroom behaviour of student teachers.

2. To study the effectiveness of training in Flanders Interaction Analysis Category System (FIACS) vis-a-vis coventional programme as a means of changing classroom behaviour of student teachers.

3. To study the effectiveness of microteaching vis-a-vis training in Flanders Interaction Analysis Category System (FIACS) as a means of changing classroom behaviour of student teachers.

In order to fulfil the objectives, the following null hypotheses were framed:—

1. Student teachers trained by microteaching do not differ in their verbal teaching behaviour in the classroom significantly as compared to the student teachers trained by a conventional pattern.
2. Student teachers trained in Flanders Interaction Analysis Category System (FIACS) do not differ in their verbal teaching behaviour in the classroom significantly as compared to the student teachers trained by traditional way only.
3. Student teachers trained by microteaching do not differ in their verbal teaching behaviour in the classroom significantly as compared to the student teachers trained in Flanders Interaction Analysis Category System (FIACS).

It may be noted that teacher behaviour or teaching behaviour in classroom is defined as verbal teacher behaviour in the classroom on the variables of Teacher Talk (TT), Student Talk (ST), Silence or Confusion (S or C), Teacher-Student Talk Ratio (T/S Ratio), Steady State Ratio (SSR), Indirect-Direct Behaviour Ratio (I/D), revised Indirect-Direct Behaviour Ratio (i/d), Extended Indirect (Ext. Indirect), Extended Direct (Ext. Direct), Categories in 3-3 cell and 9-9 cell based on Flanders Interaction Analysis Category System (FIACS) (details in chapter 2). In this study, FIACS has been used as a teacher training tool as well as an observation tool. The three treatment variables used for modifying the student teachers' behaviour are microteaching, training in FIACS and traditional teacher training methods. The measures of verbal teacher behaviour in the classroom form the criterion variables.

Design

The study was designed to have two stages: (i) pilot study and (ii) final experiment. The pilot study aimed at seeing the efficacy of the FIACS treatment as compared to traditional method of training as well as visualizing the administrative difficulties in the process of treatment being given to student teachers and of their assessment. A simple design having one experimental group (N = 10) and one control group (N = 10) was executed. The experimental and control groups were matched on variables of age, sex, marital status, area (rural or urban), marks at graduate level, teaching subjects and teaching experience. The experimental group was given the treatment of orientation to FIACS in theory only. Classroom verbal behaviour of each of the student teachers of both experimental and control groups was observed twice for thirty minutes each. The final data of the experimental and control groups were compared. Experiment was done in VIII grade of the same school in teaching of social studies. The results showed that some of the components of classroom verbal behaviour, namely, SSR (Steady State Ratio), I/D and i/d Ratios, Extended indirect, Categories in 3–3 and 9–9 cells were significantly different between the groups. This indicated that the theoretical introduction of FIACS had produced significant effect. Nevertheless, to be more sure, the final experiment was conducted by introducing one more variable of microteaching.

For the final experiment, a simple experimental pretest and post-test design with two experimental groups and one control group was executed. The experiment included ten student teachers in control group and the other ten in two experimental groups, namely, experimental microteaching group (N = 5) and experimental FIACS group (N = 5). The groups were matched with respect to the variables of age, sex, marital status, area (rural and urban), socio-economic status, marks at graduate level, subjects at graduate level, teaching subjects and teaching experience. The groups were also matched on pre-treatment observation of classroom verbal behaviour. The two treatments given to the experimental groups were the microteaching in simulation as well as in real situation to microteaching group and theoretical explanation and practical training in Flanders Interaction Analysis Category System to FIACS group. After the treatments to the experimental groups, each of the twenty student teachers was observed by FIACS for forty minutes in two separate periods of twenty minutes each. The experiment was conducted in VIII grade of the same school in social studies teaching through the medium of Hindi. The design of the study may be described diagrammatically as shown in Table 1.

Sample

Two sets of samples were used, one for the pilot study and the other for the final experiment. A sample of twenty student teachers for the pilot study was drawn out of 160 student teachers admitted for B.Ed. training in the year 1970-71 in Tilakdhari College, Jaunpur, affiliated to the University of Gorakhpur, Uttar Pradesh. A sample of twenty student teachers for the final experiment was selected out of 157 student teachers admitted to the same college in the year 1971-1972 for B.Ed.

training. The experimental class, in both experiments was VIII grade. Pupils numbering 90 and 105 in the year 1970-71 and 1971-72 respectively, from the school attached to Tilakdhari Singh Inter College, Jaunpur were used.

TABLE 1

Design of the Study

		Experimental Groups	
	Control Group ($N = 10$)	*Group I Microteaching Group* ($N = 5$)	*FIACS Group* ($N = 5$)
Pre-test	Classroom observation of 20 minutes through FIACS	Classroom observation of 20 minutes through FIACS	Classroom observation of 20 minutes through FIACS
Treatment	Traditional training two months	Traditional training two months	Traditional training two months
	Traditional training	Microteaching (simulated and classroom) for one month	Training in FIACS (Theoretical and Practical) for one month
Post-test	Classroom observation of 40 minutes in two periods of each 20 minutes through FIACS	Classroom observation of 20 minutes in one period through FIACS	Classroom observation of 40 minutes in two periods of 20 minutes through FIACS

Tools and Treatments

For gathering information relating to the matching variables an 'Information proforma' was prepared and administered to the student teachers under training. For training the student teachers, the traditional method as practised today, microteaching and Flanders Interaction Analysis Category System were used. In traditional method of training, eliciting the responses from the students was emphasized. Through microteaching procedure the training in indirect behaviour and reinforcing student participation were taken up. FIACS treatment aimed at giving practice in 'Indirect' behaviour patterns. Due to lack of resources, electric gadgets like C.C.T.V., or Videotape were not used. Teacher behaviour was measured by observing and analysing the classroom verbal interaction of student teachers and pupils using FIACS.

Measures for Analysis

Inter-observer reliability was established after computing Scott's reliability coefficient. Comparison of matrices for statistical significance was made by putting them to test by a likelihood ratio criterion developed by Darwin. The matrix indices aiding interpretations were computed on the basis of computational details given by Flanders. Student's 't' test was used for finding out the significance of differences between means of different groups on different variables.

Results and Discussion

Only the results and discussion of the final experiment based on post-treatment are given here, as they focussed more on the objectives and hypotheses of the study. To find out the effects of the traditional method of training, microteaching and training in FIACS, the interaction matrices of student teachers combined into master matrices were prepared groupwise. In order to test the hypotheses, intergroup comparisons, *i.e.*, control group versus experimental microteaching group, control group versus experimental FIACS group, and experimental microteaching group versus experimental FIACS group were made.

Control Group versus Experimental Microteaching Group

To test the first null hypothesis which asserts that there is no significant change in the verbal teaching behaviour of student teachers trained by microteaching (experimental microteaching group) as compared to the student teachers trained by conventional programme (control group) only, the interaction matrices of both control group and experimental microteaching group were tested by a likelihood ratio criterion developed by Darwin. The value of 'Z' was found to be greater than the critical value of 2.58. Hence the first null hypothesis is rejected at .01 level of significance. In other words, it is found that student teachers trained through microteaching differ significantly in their verbal behaviour patterns from the student teachers trained in traditional way only.

By way of further examining the data in greater detail, 't' test for significance of mean difference was applied for each of the eleven variables of verbal teacher behaviour in the classroom. The results of 't' test are given in Table 2.

It is seen from Table 2 that there is evidence to show that the experimental microteaching group student teachers and the control group student teachers differ significantly on the variables of 'Teacher Talk', 'Silence or Confusion', 'Steady State Ratio', I/D and i/d Ratios, 'Extended Indirect', 'Extended Direct', and Categories in 3-3 cell and 9-9 cell. With regard to the Teacher Talk variable, the difference is in favour of experimental microteaching group (73.340) and not of control group (67.106). This is understandable in the context of the comparison of Teacher Talk variable in their respective groups before and after the treatment where, the change on Teacher Talk variable was significant in control group and it was not significant in experimental microteaching group. It may be noted that the relative means of Student Talk variable of both the groups—control group and experimental microteaching group, are 15.995 and 19.691 respectively, but are not significantly different. Significant differences on the variables of Steady State Ratio, I/D Ratio, i/d Ratio, Extended Indirect, Categories in 3-3 and 9-9 cells are in favour of experimental microteaching group. As regards the significance of differences for Extended Direct it may be noted that the student teachers of control group had high Extended Direct Ratio at pre-treatment stage. There is no significant difference on the variable of Teacher Student Talk Ratio (T/S Ratio), which may be explained by indicating the result that in none of the groups it is significant at post-treatment stage. The high mean differences may be due to a few extreme ratios.

TABLE 2

Control Group versus Experimental Microteaching Group on the Basis of Post-treatment Data

Summary of the 't' Tests for Significance of Difference between Means

Variables	*Control Group* *N*=10		*Experimental MT Group* *N*=5		'*t*'
	M	*SD*	*M*	*SD*	
Teacher Talk	67.106	4.960	73.340	2.647	2.416*
Student Talk	15.995	4.224	19.691	3.125	1.613
Silence/Confusion	16.812	12.208	6.966	1.307	2.701*
T/S Ratio	4.581	2.030	3.821	.780	.751
SSR (Steady State Ratio)	82.478	1.878	67.990	3.082	10.481**
I/D Ratio	.240	.040	.375	.074	4.211**
i/d Ratio	.439	.013	.953	.023	14.182**
Ext. Indirect	1.167	.499	9.430	2.187	10.581**
Ext. Direct	1.466	.784	.049	.110	3.742**
3-3 cell	.652	.344	3.485	1.371	5.701**
9-9 cell	.111	.122	1.079	.216	10.272**

** Significant at .01 level. * Significant at .05 level.

Thus these results lead to the rejection of the first null hypothesis, since differences on the variables of Teacher Talk, Silence or Confusion, SSR, I/D Ratio, i/d Ratio, Extended Indirect, Extended Direct, Categories in 3-3 cell and 9-9 cell are significant. To summarise it may be stated that as a result of training through microteaching, student teachers of experimental microteaching group modified their behaviour significantly in the direction of using more and more acts of praising and encouraging the pupils, accepting, clarifying and building up the ideas of their pupils, providing opportunities for flexible inter-communication and pupil initiation. As a result of microteaching treatment, it seems, student teachers increased showing more of indirect influence.

Control Group Versus Experimental FIACS Group

To test the second null hypothesis which asserts that there is no significant change in the verbal teaching behaviour of student teachers trained in FIACS compared to the student teachers trained by conventional programme, only the interaction matrices of both control group and experimental FIACS group were tested on the likelihood ratio criterion developed by Darwin. The value of 'Z' was found to be 28.064 which is greater than the critical value of 2.58. Hence the second null hypothesis is rejected at .01 level of significance and there is enough evidence to infer that student teachers trained in FIACS differ significantly in their verbal behaviour in the classroom from the student teachers trained by conventional programme only.

With a view to having further probe into the differences on various variables 't' tests for significance of difference in mean scores were applied on each of the eleven variables of teacher verbal behaviour in the classroom. The results of 't' test have been given in Table 3.

Table 3 reveals that there is evidence to show that the student teachers of experimental FIACS group and those of control group differ significantly on the variables of Student Talk, Silence or Confusion, SSR (Steady State Ratio), I/D Ratio, i/d Ratio, Extended Indirect, and Categories in 3-3 cell and 9-9 cell. The significant mean differences on variables of Student Talk, I/D and i/d Ratios, Extended Indirect, and Categories in 3-3 cell and 9-9 cell are consistent with the significant mean differences within themselves shown at post-treatment stage as compared to pre-treatment stage. This may be due to the effect of FIACS treatment. Although no significant mean differ ences between control group and experimental FIACS group on Teacher Talk (67.186 and 71.642), T/S Ratio (4.581 and 3.478), Extended Direct (1.466 and .985) are reported, this is not enough evidence to warrant inference that both the groups do not differ at all. The two variables of Silence or Confusion and SSR (Steady State Ratio) significantly differentiate the groups. It is interesting to note that none of the two groups showed significant differences within themselves when the comparisons were made before and after the treatment.

TABLE 3

Control Group versus Experimental FIACS Group on the Basis of Post-treatment Data

Summary of the 't' Tests for Significance of Difference between Means

Variables	*Control Group* $N = 10$		*Experimental FIACS Group* $N = 5$		'*t*'
	M	*SD*	*M*	*SD*	
Teacher Talk	67.186	4.960	71.642	2.243	1.780
Student Talk	15.995	4.224	20.868	2.564	2.206*
Silence/Confusion	16.812	7.530	7.471	2.303	2.523*
T/S Ratio	4.581	2.030	3.478	.475	1.115
SSR (Steady State Ratio)	82.478	1.878	80.178	.863	2.424*
I/D Ratio	.240	.040	.372	.027	6.042**
i/d Ratio	.439	.073	.862	.025	11.655**
Ext. Indirect	1.167	.499	8.169	.837	18.812**
Ext. Direct	1.466	.784	.985	.378	1.207
3-3 Cell	.652	.344	3.466	1.370	5.691**
9-9 Cell	.111	.122	.766	.488	3.713**

** Significant at .01 level. * Significant at .05 level.

On the SSR variable, the mean for control group is 82.478 and for experimental FIACS group is 80.178; the significant difference may be due to the emphasis on flexibility of communication in treatment. Similarly with regard to the variable, namely, ' Silence/Confusion ' the means of control and experimental groups (16.812 and 7.471, respectively) overweigh the effect of FIACS treatment.

Another notable result, revealed in Table 3, is the significant difference on ' Student Talk ' variable between the experimental FIACS group and control group. Experimental FIACS group showed a higher mean of 20.868 as against the mean of 15.995 of control group. The result seems consistent in view of the fact that FIACS treatment emphasized indirect behaviour of student teacher eliciting more student participation. Significant difference on the variable of Categories in 3-3 cell and 9-9 cell explain that the effort of the teacher was in the direction of encouraging pupil initiative and reinforcing it by using and clarifying the ideas of pupil response. Thus the significant differences between the groups on the variables of Student Talk, Silence or Confusion, Steady State Ratio, I/D and i/d Ratios, Extended Indirect, Categories in 3-3 cell and 9-9 cell lead to the rejection of the second null hypothesis. The distinctive modification of behaviour of student teachers of experimental FIACS group may be due to objective and systematic feedback, which they could themselves get out of the knowledge of Flanders Classroom Interaction Analysis Category System, classroom observation procedure and matrix interpretation.

Experimental Microteaching Group versus Experimental FIACS Group

To test the third null hypothesis concerning no difference in the verbal teacher behaviour of student teachers trained in Flanders Interaction Analysis Category System compared to the student teachers trained through microteaching treatment, the interaction matrices of both the groups were put to test on the likelihood ratio criterion developed by Darwin. The value of 'Z' was found to be 31.748, which is far greater than the critical value of 2.58. Hence the third null hypothesis is rejected at .01 level of significance and this is enough evidence to draw an inference that student teachers trained through microteaching differ significantly in their verbal behaviour patterns in classroom from the student teachers trained in FIACS.

As a result of further probe into the differences on various variables, the summary of 't' tests in Table 4 reveals significant mean differences between the two experimental groups, namely, experimental microteaching group and experimental FIACS group on the variables of SSR, i/d Ratio and Extended Direct.

TABLE 4

Experimental Microteaching Group versus Experimental FIACS Group on the Basis of Post-treatment Data

Summary of the 't' Tests for Significance of Difference between Means

Variables	*Experimental MT Group N=5*		*Experimental FIACS Group N = 5*		*'t'*
	M	*SD*	*M*	*SD*	
Teacher Talk	73.340	2.647	71.642	2.243	.798
Student Talk	19.691	3.125	20.868	2.564	.582
Silence/Confusion	6.966	1.307	7.471	2.303	.381
T/S Ratio	3.821	.780	3.478	.475	.750
SSR (Steady State Ratio)	67.990	3.082	80.170	.863	7.615**
I/D Ratio	.375	.074	.372	.027	.080
i/d Ratio	.953	.023	.862	.025	5.196**
Ext. Indirect	9.430	2.187	8.169	.837	1.077
Ext. Direct	.049	.110	.985	.378	4.755**
3-3 Cell	3.485	1.371	3.466	1.370	.020
9-9 Cell	1.079	.216	.766	.488	1.171

** Significant at .01 level.

It is seen from Table 4 that the experimental microteaching group student teachers with a mean of 67.990 show significantly better improvement on the variable of Steady State Ratio compared to experimental FIACS group (80.170). The higher this ratio, the less rapid is the interchange between the teacher and the pupils. The lower ratio of the experimental microteaching group reveals the extent to which the teacher and the pupils are shifting from one category to another, and thus indicating more flexibility in communication in classes handled by the student teachers of the group. This effect may be due to training given through microteaching in the skill of reinforcement for eliciting participation of pupils.

The significant difference on i/d Ratio between the experimental microteaching group and experimental FIACS group having the means of .953 and .862, respectively indicates that student teachers of experimental microteaching group have more tendency to react to the ideas and feelings of the students. To a person familiar with FIACS procedure it must be clear that i/d Ratio is nothing but the Teacher Response Ratio (TRR), which is expressed as a percentage (Flanders, 1970). Invariably the class will be paying more attention to the teacher when he begins his reactions to something a pupil has said. Each communication re-entry of the teacher is crucial, in so far as, it sets the stage for the ensuing succession of events. This modification in teacher behaviour might only be due to microteaching training.

Again, on the variable of Extended Direct, the significant difference is revealed between experimental microteaching group with a lower mean of .049 and experimental FIACS group with a higher mean of .985. It may be noted that significant decrease of percent on Extended Direct variable indicate positive motivation and improvement in the direction of indirect behaviour by experimental microteaching group student teachers.

Besides these, the higher means on the variables of I/D Ratio, Extended Indirect, and Categories in 3-3 cell and 9-9 cell in experimental microteaching group, although not significantly different indicate greater tendency of the group towards indirect behaviour. Mean differences on the variables of Teacher Talk, Student Talk, Silence or Confusion, T/S Ratio, are not significant. These are consistent in the light of the previous results already discussed.

Therefore, these results lead to the findings that :—

1. The first null hypothesis is rejected at .01 level of significance. This means that student teachers trained through microteaching significantly change their verbal teaching behaviour in the classroom compared to the student teachers trained in traditional way only.

2. The second null hypothesis is also rejected at .01 level of significance. This leads to the conclusion that student teachers trained in Flanders Interaction Analysis Category System change their verbal teaching behaviour in the classroom significantly, compared to the student teachers trained in traditional way only.

3. The third hypothesis is rejected at .01 level of significance to conclude that student teachers trained through microteaching change their verbal behaviour in classroom significantly better compared to the student teachers trained in Flanders Interaction Analysis Category System.

Conclusions and Implications

By and large, the study has richly helped to seek the answers to the questions raised and put as objectives of the study. The answers have the educational implications for the teacher training colleges in particular and education in general. It may be useful for the teacher training colleges in India to give special attention to this. In the light of the objectives the conclusions with their educational implications are given below.

1. On the basis of the data regarding classroom verbal behaviour of student teachers, there is enough evidence to infer that the student teachers given the treatment of microteaching showed significantly different classroom verbal behaviour as compared to student teachers of the control group. The

data also suggest the direction in the change of student teacher behaviour. Significant differences on the variables of Silence or Confusion, Steady State Ratio, I/D and i/d Ratios, Extended Indirect, Extended Direct, Categories in 3-3 cell and 9-9 cell, whether increased or decreased, are indicative of modification of behaviour in positive direction. Noteworthy significant feature of the modification in the verbal behaviour of the student teachers, trained through microteaching, are on the variables of Steady State Ratio, and Categories in 3-3 cell and 9-9 cell. They indicated flexibility in interchange of communication, more use of student initiated ideas, their clarification and pupil initiation which may be considered essential in order to reach those levels of cognitive functioning that require independent thinking and self-direction.

For a pre-service teacher training programme, inclusion of microteaching as an organized activity needs consideration. Microteaching is based on the assumption that there are certain patterns of behaviour, rather strategies, which are crucial to effective classroom instruction. By concentrating on these strategies in a programme of teacher education, it should be possible to improve teaching by practising certain phases of teaching, one phase at a time. A single teach-reteach cycle can be accomplished in less than thirty minutes. It is the reteach opportunity to which microteaching owes its success. For practice through microteaching with reteaching, the following skills may be included : (i) providing reinforcement for the pupils, (ii) ways that the teacher can vary the stimulus, give emphasis, and maintain attending behaviour, (iii) set induction, which refers to the ways with which the teacher can create interest in pupils for a unit of study, (iv) lecturing and use of audio-visual materials with attention to variation, pacing, and appropriateness, (v) illustrating and using examples, which refer to moving from simple to complex ideas, (vi) skills of summarizing and ways to emphasize the more important learnings, (vii) teacher initiated questions, and (viii) student initiated questions. These are some aspects of classroom interaction which seem crucial to effective teaching. Since micro-teaching is a scaled down version of teaching in which the number of pupils, time, and learning objectives are all curtailed, the concern for total class management should not interfere. With the teach-reteach possibilities, teachers are oriented towards component skills of teaching and they may manage a bigger class with more confidence because they proceed after analyzing one's performance and then trying to improve.

2. In answer to the question whether treatment of Flanders Interaction Analysis Category System is significantly better in the modification of classroom verbal behaviour of student teachers as compared to the verbal behaviour of the control group student teachers, it may be said that there is evidence to conclude that FIACS training did help the student teachers to change their verbal behaviour in the classroom. As a result of training, they changed significantly in the direction of using more and more acts of praising and encouraging the students for more participation, and accepting and building up the ideas of the students. There was also a tendency on the part of student teachers who underwent training to use less lecturing, directing and criticizing. As a result of the training, the indirect/direct influence ratios of experimental teachers increased showing more of indirect influence.

It may be useful for the teacher training institutions in India to pay special attention to this. Experimentation may be taken up in a few colleges, by way of teaching interaction analysis as well as by using it in practice teaching programme, which may bring more awareness among the student teachers about their classroom behaviour. However, any such training in interaction analysis should not be prescriptive to Flanders' system, it should be left to the teacher educators to experiment with new patterns, see the results and then follow the useful patterns. Flanders Interaction Analysis Category System like any other technique is an assessment technique which requires some practice, a little guidance and some time to think about and see what is being done. It is an objective tool which involves the observer, in detailed analysis, to identify the kinds of interaction that takes place in the classroom. This quantitative study makes it possible to describe objectively the pattern of lesson. This technique of quantifying the qualitative aspects of verbal communication may be used as a training technique. Student teachers trained in interaction analysis may apply it either to their own lesson after it has been duly observed by the supervisor or some other colleague, or may act as an observer when invited to do so by another colleague. The conferences and discussions that result can provide the participants with new insights into their own or their colleague's behaviour. Apparently, teachers have a great interest in and need for objective information about their own patterns of influence, how these patterns match their intentions and whether the differences they expected from different patterns did or did not occur. There is a possibility that interaction analysis can contribute to teacher education.

3. Synchronising microteaching with interaction analysis in teacher training programme is possible rather, in a way, essential when the electronic gadgets are not being used to record the lessons for review afterwards. If the categories and their interpretation could highlight features of teaching that were being practised, then there would be several advantages. In the present study, FIACS was used as an observation and behaviour interpretation tool combined with microteaching. Here the purpose was not to give both the treatments to the same group of student teachers. Therefore, it was not given as treatment. There may be some other tools to provide feedback to student teachers, but this quantification of the verbal behaviour may help the student teacher to analyze his own teaching behaviour and to get objective feedback himself out of its interpretation. Combining microteaching with interaction might help to make microteaching a more potent training experience than would be true without interaction analysis in our present Indian conditions, where costly electronic gadgets as C.C.T.V. or Videotape have no possibility of being provided.

Therefore, the programme which combines systems of coding verbal communication with microteaching have special implication in Indian conditions. The major advantages reported by those who conducted such combined programme, were the greater specification of the skill to be practised and more objective information about the performance itself. In the classroom for longer period of teaching, video playback becomes time consuming and therefore, inefficient. Interaction analysis feedback is reported to be faster which could focus on specific skills providing the behaviour patterns. It is quite possible that interaction analysis combined with microteaching would provide a potent training procedure for helping to develop and control teaching behaviour.

4. Obviously, the question of usability of microteaching and Flanders Interaction Analysis Category System follows the conclusion that the use of microteaching and FIACS have shown more promising results in the modification of student teacher verbal behaviour in the classroom. This is also a fact that traditional practice teaching had an impact on modification of teacher behaviour. Although the bountiful good results are evidenced by innovatory techniques of microteaching and FIACS in the modification of student teachers' verbal behaviour, they may not be prescribed as universal panacea. But on the basis of the results of the experiment described in this work, of course first attempt in Indian conditions, it is an invitation to all those who are concerned with the modification of student teacher verbal behaviour in the classroom for effective teaching to make an impartial re-appraisal, noting the inefficiency of existing methods of conducting practice teaching programme and the promise of alternative approaches. Such evidences are not readily available through this piece of research as to which technique of producing teacher is superior to any other. It would be a better part of wisdom to provide explicit programmes with carefully designed training materials, rather than rely upon haphazard training and accidental modification of verbal teacher behaviour.

The application of the use of these techniques in teacher training programme at the present juncture will depend more on the consideration of existing situation in a particular training institute, its personal resources, initiative, keenness and the level of urgency with which the staff of a training college views the challenge. A college may start only with imparting a theoretical knowledge of Flanders Interaction Analysis Category System, proceed further in training student teachers in observation, preparation of matrix and its patterns, supervisor's training in the system for objective feedback and thus, improving assessment procedures based on the objective observation of student teacher performance in the classroom. On the other hand, microteaching offers the advantage of both the controlled laboratory environment and the reality of bonafide teaching. If the paucity of practising school or the situation in the school does not permit, the whole microteaching programme may be arranged in simulated condition, which means the opportunities to practise skills in the group of student teachers themselves. The student teacher can benefit from such experiences, which he might not receive, if dependent upon fortuitous events in the practising schools. If the school permits, the whole programme may be designed in such a way that maximum utilization of the resources, time and personnel may be made. Obviously, the general idea is subject to variation from situation to situation. The size of the class may be manipulated. The number of trainees teaching a given group of children can be increased. Duration of the lesson can be lengthened, and the nature of the teaching task can be made more complex, so as to embrace a group of technical skills. But idea of analyzing teaching in terms of technical skills, practising them with the benefit of objective feedback and the reteach cycle are the heart of the method. It may provide opportunity for a close supervision, practising manageable objectives established according to individual training needs and progress, continuous diagnostic feedback, self-evaluation, and immediate guidance in the area of demonstrated deficiency, with a probability to repeat a lesson conveniently as often as desirable.

10

EFFECT OF CLASSROOM BEHAVIOUR TRAINING ON THE CLASSROOM INTERACTION PATTERNS OF STUDENT TEACHERS AND PUPIL OUTCOMES

Basis of Teacher Education

The ultimate aim of teacher education is to prepare effective teachers—teachers who are capable of bringing about the desired behavioural changes in pupils under their charge, to an optimal level, in relation to the input in terms of human energy and material resources expended in the process. Teacher education attempts, or is presumed to attempt, to meet this challenge following a few assumptions. In the first place, it is assumed that there is an adequate concept of teaching. Secondly, it is assumed that this concept of teaching can be operationalised in terms of teaching behaviour patterns invariably related to the desired educational outcomes. Thirdly, it is assumed that there are certain training techniques available, through which requisite teaching behaviour patterns can be developed in prospective teachers to effect the desired educational outcomes. Lastly, it is assumed that once the teaching behaviour patterns are acquired by prospective teachers during their course of training, these behaviour patterns are sustained and carried over to their assigned teaching positions in the profession till more efficient teaching behaviour patterns are discovered and mastered.

Without Feet

A careful examination of the assumptions cited above reveals that teacher education has been without feet for a long time. In the absence of empirical data, the concept of teaching was governed by philosophical conceptions and psychological theories

N. K. JANGIRA

of learning. As a consequence, teaching behaviours were also derived from the same sources. Practice of some distinguished teachers also contributed to the pool to some extent. Broudy (1963) in "Historic Exemplars of Teaching Method", Smith (1963) in "Towards a Theory of Teaching", Wallen and Travers (1963) in "Analysis and Investigation of Teaching Methods", Gage (1969) in "Teaching Methods", and Mitra (1970) in "Psychology of Teaching" provide referential evidence to this effect. The concept of teaching and teaching behaviours derived from learning theories and philosophical conceptions, however, have been considered inadequate as they fail to encapsulate the complex transactions featuring classroom teaching. Smith observes :

> From casual observation of teaching, we came to the conclusion that actual classroom teaching does not conform to the methods of teaching described in textbooks. This conclusion has been sustained by subsequent observation. Actual teaching is so varied, so complex, so fluid as almost to defy any description whatsoever; and it certainly does not correspond to the concepts of method set forth in the treatises on the subject. When we speak of methods of teaching, we are speaking, not about realities, but about the picture of teaching we have built up out of the ideas borrowed from psychology and philosophy (Smith, 1963; p. 3).

The effectiveness of the techniques of training prevalent in teacher training institutes also appears to be doubtful. The prospective teachers during their student teaching are placed under the supervision of a teacher educator who is presumed to be possessing better teaching skills than the prospective teachers so as to enable them to translate theory and principles of teaching into practice. The evidence regarding the efficacy of this approach is far from satisfactory. Amidon's experience is illustrative of the fact :

> In the fall semester of 1962-63, a new course, The Teaching-Learning Process, was introduced into Secondary Education curriculum at Temple University. A year of planning and

> preparation preceded the introduction of the course. The particular purpose of the course was to develop understandings of the principles of teaching and learning as they apply to classroom methodology. The course met for four hours each week—two hours of lecture on principles, and two hours of laboratory designed to illustrate principles of teaching and learning through experiments in learning and stimulation of teaching-learning situation. By mid-semester it seemed apparent to the instructors teaching the course, that inspite of a year's planning and preparation, the course wes not meeting the instructors' expectations. This seemed to be evidenced in the students' inability to translate the theory they had learned to their own teaching performance. While the students seemed to have developed some understanding of basic principles of teaching and learning, they seemed to apply such principles to their situation at anything more than a superficial level. In addition, students often commented that they could see no real purpose for this course. They seemed to view the course as highly abstract and non-functional. A student evaluation of the course added further support to the instructors' informal evaluation (Amidon and others, 1967; p. 1).

The gap between theory and practice has become virtually proverbial.

> The point is that much of what is learned in education courses is neither conceptualised, quantified nor taught in a fashion that builds a bridge between theory and practice (Flanders, 1967b; p. 283).

The discrepancy between what is taught in teacher training institution and what is practised by the prospective teachers, when they join their assigned teaching positions in the profession becomes conspicuous when actual classroom teaching is observed. Anderson and others (1946), Withall (1951), Hughes (1959), Flanders (1965), Amidon and Hunter (1966) abroad; and Buch and Santhanam (1970 a), Buch and Quraishi (1970), and Mitra (Jr.) (1971) in India found most of the teachers observed to be dominative or controlling, and have predominantly direct teacher influence and lack flexibility in the classroom. This is just contrary to what theory, principles and practice of education courses convey to the prospective teachers.

In absence of adequate concept of teaching, operationalised effective teaching behaviour patterns, and techniques of training, our teacher education programmes appear to be ad hoc, shaky and without feet. This state can be attributed to inadequate research on teaching and near failure of research on teacher effectiveness.

Gaining Feet

A series of gloomy reviews of research on teacher effectiveness, *viz.*, Orleans and others (1952), Ackerman (1954), Morsh and Wilder (1954), Johnson (1955), Mitzel (1960), Barr (1960), Fattu (1962), Anderson and Hunka (1963), Medley and Mitzel (1963) and Biddle (1964) reflect the prevalent thaw in the field for more than half a century, and consciousness about the dire need to remedy the situation, to improve teaching led to concerted attempts. The results are optimistic . A number of tools have been designed, procedures and techniques have been developed to analyse teaching. Medley and Mitzel (1963), and Simon and Boyer (1967, 1969) reviewed the systems of classroom observation developed to collect empirical data on teaching. Smith (1961, 1966), Bellack (1963, 1966), Hughes and others (1959), Turner (1964), Gallagher (1968), Honigman (1968) and Adams and Biddle (1970) represent some of the significant attempts in this direction. The initial optimism can be marked in recent reviews. Gage, justifying his search for the "desirable behaviour of teachers" expresses this optimism :

> .... The recent upsurge in the amount and quality of research on teaching may have rendered obsolescent the dismal conclusions of previous reviews of literatures (Gage, 1965; p. 85).

Flanders and Simon voice cautious optimism :

> .... This may be the first review that can marshal a set of widely separated research studies which provide statistically significant support for a particular type of relationship. The primitive quality of our present knowledge is exemplified by the concepts, method of quantification, and lack of specificity to be found in the relationship. Nevertheless, it can now be stated with fairly high confidence that the *percentage of teacher statements that make use of ideas and opinions previously expressed by pupils is directly related to average class scores on attitude scales of teacher attractiveness, liking the class, etc., as well as to average achievement scores adjusted for initial ability* (Flanders and Simon, 1969; p. 1426).

Rosenshine (1969, 1971) also supports the optimism, but at the same time exhorts for more work with increased efficiency of design and analysis. It appears that effective teaching behaviour patterns, *i.e.*, the teaching behaviour patterns related to pupil outcomes are being identified with some measure of success, and it may not be a vain hope to expect that with continued efforts more success will ensue.

Alongwith the breakthrough in analysing teaching behaviour, came a breakthrough in the techniques of training in teaching skills. The techniques of interaction analysis to provide systematic feedback about teaching behaviour, microteaching and simulated skill training exercises, are proving more effective than the conventional practices being employed to impart teaching skills to the student teachers. To quote again Flanders and Simon, who concluded the review of presage-process research, thus :

> .... The sweet is the remarkable progress from 1960-66, in developing training experiences which do hold promise of providing a foundation upon which new pre-service and in-service programs can be built. A program of such experiences may include simulating teacher-pupil interaction

> by using adult-to-adult social-skill training exercises. It may also include quasi simulated microteaching program which make use of " live teacher pupil interaction " under highly focused and controlled conditions which permit intensive feedback, ending with carefully programmed experiments involving a teacher's working with a full sized class. Much work still remains, but the early results give reason for some optimism (Flanders and Simon, 1969; p. 1431).

Need for Further Work

The breakthrough achieved in research on teacher effectiveness cited above is promising for teacher education, as it will provide the much needed foundational data, resulting in improvement of the existing programmes. Whatever has been accomplished so far is only spadework. Flanders (1969), conscious of the " primitive quality of our knowledge ", feels that " much still remains " to be done. Biddle (1967), Gage (1967), Flanders (1970), Rosenshine (1971), and Turner (1971) outline the directions along which research attempts have to be channelled.

A lot of empirical data on effective teaching behaviour patterns and techniques through which these can be developed in teachers is still needed. It is yet to be confirmed whether differential teacher education programmes produce differential teaching behaviour patterns, and if they do, whether these teaching behaviour patterns are carried over to the actual teaching performance of the prospective teachers, subsequently.

> .... If research findings are to be of value in teacher education, they must at least be able to show differences between particular kinds of teacher education programs. Indeed, if research is really to be of value, it must ultimately be able to show the relationships between particular treatments in particular education programs and subsequent teacher performance (Turner, 1971; p. 11).

Rosenshine and Furst go a step further and specify the criteria of subsequent performance :

> .... Experimental studies in teacher education involve a number of steps. The first step is to determine whether teachers, trained for specific performance criteria, behave differently in their classrooms from similar teachers who do not receive the training. But it is more important to determine whether the trained teachers engender greater cognitive or affective growth in their students compared to the controls (Rosenshine and Furst, 1971; p. 65).

The authors feel that " hypothesis derived from process-product studies and other studies on instruction can be validated only through experiments of this type " (Rosenshine and Furst, 1971; p. 65). There is a dearth of this type of studies.

The Present Study

The present study was designed to respond to the above need. The study envisaged a comparison of the effectiveness of two approaches—Classroom Behaviour Training (CBT) based on interaction analysis vis-a-vis conventional programme of student teaching—in developing responsiveness, indirectness and flexibility in the classroom behaviour of prospective teachers; follow up of the prospective teachers to assess sustenance and carry over of the effects of CBT when they join their assigned teaching positions; and comparison of students under the two groups of prospective teachers on adjustment, dependency and classroom trust behaviour.

The study was conducted in two phases. In the first phase, type of student teaching (CBT based on interaction analysis and conventional student teaching) formed the independent variables and classroom interaction patterns (Percent-Pupil Talk, Percent-Teacher Talk, Percent Silence or Confusion, Teacher Response Ratio, Teacher Instantaneous Response Ratio, Teacher Question Ratio, Teacher Instantaneous Question Ratio, Pupil Initiation Ratio, Content Cross Ratio, Steady State Ratio, Pupil Steady State Ratio and Miller Flexibility Ratio) formed dependent variables. In the second phase, the classroom interaction patterns assumed the status of independent variables along with the type of student teaching, while pupil scores on Pre-Adolescent Adjustment Scale (PAAS), Pre-Adolescent Dependency Scale (PADS) and Pre-Adolescent Classroom Trust Schedule (PACTS) formed the dependent variables.

Search for the Basis of Classroom Behaviour Training

The Classroom Behaviour Training should take into account the effective teaching behaviours and techniques of training found to be suitable for developing the same in teachers. Survey of process-product studies and presage-process studies with particular reference to training was considered essential to identify both.

Process-Product Studies

Anderson and his associates (1939, 1945, 1946) using direct classroom observation found that with higher proportion of teacher integrative contacts, pupils show more spontaneity and initiative, voluntary social contribution, and acts of problem solving, while with higher proportion of teacher dominative contacts, the pupils are more easily distracted from school work, show more compliance to and rejection of teacher domination. Lewin (1939) in a laboratory experiment demonstrated that interaction in a children's club with democratic leaders were more spontaneous, more fact-minded, and friendly than those of a club with authoritarian leader. Flanders (1951) found that a sustained dominative pattern of teacher behaviour was consistently disliked by pupils, reduced their ability to recall later on the material studied and produced disruptive anxiety as detected by galvanic skin response to changes in heart beats. Integrative contacts produced reversed responses. Perkins (1951) using Withall's technique found that groups of teachers with integrative behaviour engender greater learning about child growth than dominative type of teachers.

A number of studies reported positive relationship between indirect influence and adjusted pupil achievement and attitudes (Flanders, 1965, 1969, 1970), language usage, social study skills, arithmetic computation and problem solving and pupil attitudes (Morrison, 1966), linguistic skills learning (Nelson, 1964), social studies (Herman, 1967), Biology (Lashier, 1967) verbal recall (Schantz, 1967), incidence of thought provoking questions (John, 1968; Dodl, 1966; Parakh, 1965.), verbal creativity (Weber, 1968), Mechanical drawing skills (Alexander, 1970), and attitudes (Mitra, 1970). Studies by Furst (1967), Soar and Soar (1969), Pareek and Rao (1971 a) and Lulla (1973) are some others supporting the relationship.

Superior teachers as judged by their supervisors and administrators were found to be more indirect than their counterparts (Amidon and Giammatteo, 1965). Pankratz (1967) found more effective Physics Teachers classified on the basis of their scores on Principal's ratings, Teacher Situation-Reaction Test and average scores of pupil attitudes, evincing more indirect teaching behaviour patterns than less effective teachers.

Coats (1966) re-analysed the relationship between pupil's attitude and achievement scores versus classroom interaction variables derived from 10 × 10 interaction matrices. Carrying out stepwise linear regression of the data, reported earlier by Flanders (1965) and Morrison (1966), he found it possible to predict accurately post-test class average scores from the pre-test averages. This further supports the relationship.

Cogan (1956) administering a pupil questionnaire, found that the student teachers who perceived their ideas as central to classroom decisions, did more often, the school work assinged to them as well as the school work not assigned to them. Miller (1966) reported that student teachers with responsive teaching, viewed their lessons more favourably and exhibited higher level of thinking than the student teachers with directive teaching.

A few studies, however, failed to support the above relationship (Snider, 1965; Birkin, 1967; Measel, 1967). Despite a few studies failing to support the relationship between teacher acceptance and use of pupil ideas and product-variables, it appears that *teacher responsiveness rather than initiation, teacher acceptance and use of students' ideas or opinions, and flexibility of* *teacher influence in the classroom are positively related to pupil achievement in different content areas, as well as to a number of other outcome variables like attitude, independence and self-direction, verbal recall, creativity, incidence of thought provoking questions, manipulative skills, etc. This implies that the Classroom Behaviour Training proposed in the present study should take into account the teaching behaviour patterns based on the findings.*

Presage-Process Studies

Presage-process research includes studies linking teaching process to teacher characteristics and formative experiences including training. This coverage, however, is confined to the research linking training experiences of teachers and their teaching behaviour patterns.

Flanders (1963 c, 1969), Amidon and Powell (1966), Moskowitz (1967), Zahn (1966), Simon and others (1966), Simon (1967), Lohman, Ober and Hough (1967), Amidon (1967), Hanny (1967), Ishler (1967), Davidson (1968), Wood and others (1969), Wright, Nuthall and Lawrence (1970), Holcomb (1971), Pangotra (1971) and Pareek and Rao (1971 a) report effective use of feedback based on interaction analysis, singly or combined with simulated teaching exercises or micro-training, in modifying the teaching behaviour patterns of the pre-service or in-service teachers in the intended direction. In other words, *when pre-service or in-service teachers receive instruction in interaction analysis, they analyse their own behaviour patterns, formulate directions of change, receive continuous feedback about their observed teaching behaviour patterns, they tend to change their teaching behaviour patterns in the desired direction. This implies that CBT should take into account the rationale provided by these studies.*

Restatement of the Objectives

In the light of the above discussion, the specific objectives can be stated as under :

1. To provide to a group of student teachers CBT based on interaction analysis and compare classroom interaction patterns of this group of student teachers with the classroom interaction patterns of another group of student teachers having undergone conventional programme of student teaching.
2. To follow up the two groups of student teachers at (1) above, when they join their assigned positions in the teaching profession to study sustenance and carry over of the classroom interaction patterns acquired in the training institute.
3. To compare the performance of the pupils under the two groups of student teachers at (2) above, on Pre-Adolescent Adjustment Scale (PAAS), Pre-Adolescent Dependency Scale (PADS) and Pre-Adolescent Classroom Trust Schedule (PACTS).

Hypotheses

To achieve the objectives of the study, the following hypotheses were formulated :

1. Student teachers with CBT, at the end of their student teaching experiences, will score higher on PPT, TRR, TRR 89, TQR, TQR 89, PIR, PSSR and MFR, and will score lower on PTT, PSC, and SSR, than the student teachers with conventional programme of student teaching.
2. The student teachers with CBT based on interaction analysis, after joining their assigned positions in the teaching profession, will score higher on PPT, TRR, TRR 89, TQR, TQR 89, PIR, PSSR, and MFR and will score lower on PPT, PSC, and SSR, than the student teachers with conventional programme of student teaching.
3. The pupils under the student teachers with CBT based on interaction analysis will score higher on PAAS, PADS and PACTS than the pnpils under student teachers with conventional programme of student teaching.

Delimitation of the Study

1. Both verbal and non-verbal classroom behaviour mark transactions in the classroom. The present study, however, was confined to verbal behaviour only. One reason guiding the decision was the reliability with which verbal classroom behaviour can be observed, recorded and measured. Secondly, the classroom transactions are predominantly verbal. Seventy to eighty percent of the teaching is covered by teacher or student talk (Amidon and Hunter, 1966). Moreover, compatibility of the verbal and non-verbal behaviour is also considered probable under normal situations. So this may not be a serious limitation. This does not, however, belittle the significance of non-verbal behaviour and its study in its own right.
2. Exhaustive list of pupils' criteria of teaching effectiveness awaits the research workers in this area. But, due to the limitations of time and resources, the present study was limited to only three pupil outcomes, viz., adjustment, dependency, and classroom trust.
3. Classroom observation being a time consuming process, the study was limited to only 20 student teachers and 398 pupils in their assigned classes. The study lays emphasis on depth rather than on peripheral work. That is why the ultimate effectiveness of the student teachers after joining their assigned positions in the profession was studied.

Sample

The study involved twenty male student teachers being prepared for primary schools.

The sample of pupils included in the second phase of the study was incidental, as it depended upon the school where a particular student teacher was appointed after the completion of his training. However, the department was requested to appoint the student teachers in schools which are similar as far as possible. The type of school, management, and size of the school were taken into consideration for their appointment. Number of pupils and their age have been shown in Table 1:

TABLE 1

Number of Pupils in Classes with the Control Group and the Experimental Group Student Teachers

Group	*School*	*Number of Pupils*	*Average age in years*
Control	S-1	20	10.32
	S-2	18	10.08
	S-3	19	9.75
	S-4	20	10.12
	S-5	16	10.50
	S-6	18	9.80
	S-7	20	9.58
	S-8	18	10.11
	S-9	16	9.32
	S-10	20	9.83
	Total	185	99.51
	Average	18.5	9.95
Experimental	S-11	19	10.52
	S-12	18	9.63
	S-13	24	9.38
	S-14	20	10.80
	S-15	19	9.98
	S-16	22	9.34
	S-17	24	10.31
	S-18	23	10.58
	S-19	20	9.62
	S-20	24	10.25
	Total	213	100.20
	Average	21.3	10.02

The number of pupils under the student teachers in control and experimental groups was 185 and 213, with an average of 18.5 and 21.3, respectively. The average age of the pupils in the two groups was 9.95 years and 10.02 years, respectively.

Design

The study employed pretest, post-test and control group design in two phases. The design envisages two groups comprising ten student teachers each, one serving as the experimental group and the other as the control group.

The experimental group is given treatments T_1, T_2 and T_3 at different intervals in a sequence. Treatment T_1 refers to the conventional programme of student teaching, wherein student teachers prepare teaching units, lesson plans, and teaching aids. They give lessons and receive feedback in the form of usual supervisor comments, without the aid of systematic observation instruments. Treatment T_2 involves theoretical orientation to interaction analysis after Flanders, practice in observation, preparation of interaction analysis matrices and their interpretation. Treatment T_3 provides feedback to the student teachers on their teaching using Flanders Interaction Analysis Category System (FIACS).

The pre-training measures on classroom interaction are to be followed by four post-training observations. Pretest and post-test measures of pupils under the experimental and the control group of student teachers are also to be obtained on PAAS, PADS and PACTS.

Table 2 summarises the design of the study :

TABLE 2

Design of the Study

Phase	Duration	*Treatment*		*Data Collection*	
		Control group	*Experimental group*	*Control group*	*Experimental group*
I	One week	T_1-conventional programme of student teaching.	T_1-conventional programme of student teaching.	Observation of the classroom behaviour of student teachers using FIACS.	Observation of the classroom behaviour of student teachers using FIACS.
	40 hours, spread over 10 days	T_1-conventional programme of student teaching.	T_2-Intensive Classroom Behaviour Training based on interaction analysis.		
	Six weeks	T_1-conventional programme of student teaching.	T_3-feedback based on interaction analysis.	*Post-training I* Observation of classroom behaviour of the student teachers using FIACS.	*Post-training I* Observation of classroom behaviour of the student teachers using FIACS.

TABLE 2 (Contd.)

Phase	Duration	Treatment		Data Collection	
		Control group	*Experimental group*	*Control group*	*Experimental group*
	Two weeks	T_1-conventional programme of student teaching.	Feedback based on interaction analysis stopped. No treatment.	*Post-training II* Observation of the classroom behaviour of student teachers.	*Post-training II* Observation of the classroom behaviour of student teachers.
II	After fourteen weeks			(a) *Post-training III* Observation of the classroom behaviour of the student teachers, when they join their schools, using FIACS. (b) *Pretest* Administration of the PAAS, PADS, and PACTS to the pupils.	(a) *Post-training III* Observation of the classroom behaviour of the student teachers, when they join their schools, using FIACS. (b) *Pretest* Administration of the PAAS, PADS and PACTS to the pupils.

TABLE 2 (Contd.)

Phase	Duration	Treatment		Data Collection	
		Control group	*Experimental group*	*Control group*	*Experimental group*
III	After eight weeks			(a) *Post-training IV* Observation of the classroom behaviour of student teachers using FIACS. (b) *Post-test* Pupil performance on PAAS, PADS and PACTS.	(a) *Post-training IV* Observation of the classroom behaviour of student teachers using FIACS. (b) *Post-test* Pupil performance on PAAS, PADS and PACTS.

Controls

Some of the factors affecting validity of the experiment were controlled through design, administrative arrangement and statistical analysis. Table 3 gives independent variables, dependent variables, factors controlled and the kind of control employed.

TABLE 3

Independent Variables, Dependent Variables and Controls

Phase	Independent Variables	Dependent Variables	Controls	
			Factors	Control employed
I	Type of student teaching experiences— Conventional Vs. based on Classroom Behaviour Training	Classroom interaction variables, viz., PTT, PPT, PSC, TRR, TQR, TRR 89, TQR 89, PIR, SSR, PSSR, CCR, MFR	1 Sex of the student teachers	1 Administrative (only males selected)
			2 Grade to be taught	2 Administrative (only class IV to be taught)
			3 Subject to be taught	3 Administrative (English structures to be taught)
			4 Initial ability of student teachers	4 Statistical (Analysis of covariance)
II	Type of student teaching experiences and resultant classroom interaction variables,	Pupils performance on PAAS, PADS, PACTS	5 Contamination between the experimental and control groups	5 Administrative (Isolation of the two groups)
			6 Halo effect	6 Administrative (Ignorance about the experiment)

TABLE 3 (Contd.)

Phase	*Independent Variables*	*Dependent Variables*	*Controls*	
			Factors	*Control employed*
	viz., PTT, PPT, PSC, TRR, TQR, TRR 89, TQR 89, PIR, SSR, PSSR, CCR, MFR		7 Inter-session history	7 Design
			8 Maturation	8 Design
			9 Testing	9 Design
			10 Regression	10 Design
			11 Instrumentation	11 Tool reliability
			12 Other teacher influence on pupils	12 Administrative (One teacher-one class system)
			13 Pupils' initial ability	13 Statistical (Analysis of covariance)
			14 Treatment fidelity	14 Actual observation of the classroom behaviour of teachers

Tools Used

Flanders Interaction Analysis Category System (FIACS): FIACS is a widely used observational tool comprising ten categories. The details appear in Chapter 2 of this book.

Pre-Adolescent Adjustment Scale (PAAS)

This is a scale developed by Pareek and Rao (1970 b) to measure adjustment of the pre-adolescent towards home, school, peers, teacher and it also measures general adjustment. It consists of forty items covering the five areas of adjustment. Scoring weightage of the items ranges from — 10 to + 10.

The pupils are required to read the items carefully and tick-mark (√) the ones applicable to them. If the items are not applicable to a pupil, he is not to write anything against that item. Some of the sample items are :

(————) My parents give me full freedom to play.
(————) I do not want to make many friends.
(————) The school is a burden for me.

Range of scores, test-retest reliability, and validity against teacher reports about the adjustment of students in respect of the five sub-scales have been given in Table 4.

TABLE 4

Range of Scores, Test-Retest Reliability Coefficients and U-Values (PAAS)

Scales	*Range of Scores*	*Test-Retest reliability* (a)	*Test-Retest reliability (control group)* (b)	*U-values for validity*
Home	+ 10 to — 10	.46	.54	.008 and .206
School	+ 6 to — 10	.60	.63	.001
Peers	+ 6 to — 10	.54	.52	.028
Teachers	+ 6 to — 10	.278	.48	Not given
General	+ 6 to — 6	.44	.53	.100 and .208
Total	+ 34 to — 46			

(a) Highest values taken.
(b) Computed from the scores of the pretest and post-test scores of the control group.

Pre-Adolescent Dependency Scale (PADS) Form A

PADS Form A consists of ten items—the first half denotes dependency items, while the other half denotes independency (or lack of dependency). It contains items like :

"I blindly follow everything the teachers tell me."

"I am easily persuaded by others."

The pupil is required to read the item, and tickmark (√) against the item in one of the three columns 'mostly', 'sometimes', and 'rarely' which he thinks represents his position. The items are scored 2, 1, 0 for 'mostly', 'sometimes' and 'rarely' for independence items, 0, 1, 2 for 'mostly', 'sometimes' and 'rarely' for dependence items, respectively. The total of all scores gives dependency score for an individual.

The test-retest reliability has been reported to be .77 by Pareek and Rao (1970 b). The test-retest reliability worked out from the pretest and post-test scores of the control group in the present study is .74.

Pre-Adolescent Classroom Trust Schedule (PACTS)

PACTS is a semi-projective tool. It consists of common classroom situations calling for pupil's reactions or the actions proposed in the situations. The responses are scored as 4, 3, 2 or 1 according to the degree of trust, represented by the response. The split-half reliability of the scale has been reported to be .814 and test-retest reliability .77. The test-retest reliability, worked out from the pretest and post-test scores of the control group is .71.

PACTS has such items as :

The teacher praised Tenzing as a very good student and pointed out that he got the highest percentage of marks in Mathematics. Tshering also got the same percentage of marks, but the teacher forgot to mention his name. What does Tshering think? Mark any one of the statements :

(—) The teacher is partial towards Tenzing.

(—) The teacher should have praised me too.

(—) I should see the teacher after class and show my marks.

(—) I hope some other day the teacher will praise me.

In PACTS developed by Pareek and Rao (1970 b), a slight modification was made. The names of the pupils were changed to suit the local environment.

Sequence of Events

Observer Training

The investigator had already established an inter-observer reliability of .88 with the workers in the National Institute of Education, Delhi, and then in the Centre of Advanced Study in Education, Baroda. Before starting the experiment, another two supervisors of the institute were trained in observation. They achieved inter-observer reliability coefficient of .82 and .84, respectively with the investigator.

Assignment of the Subjects

Ten student teachers were assigned to the control group and another ten to the experimental group randomly through using table of random numbers. The assignment of the pupils in second phase of the study was incidental, as it depended upon the school in which a particular student teacher was appointed after completing his training.

Pre-training Stage

The experimental and the control groups followed the same curriculum in theory and practice of education. These included courses in (i) Foundations of Education including problems of Primary Education, (ii) Educational Psychology, (iii) Principles and Methods of Teaching, (iv) Methods of Teaching English, Vernaculars, Social Studies and General Science, (v) Health Education ,(vi) Art Education, (vii) Gardening and (viii) Elementary Carpentry. The course was covered through lectures, group discussions, debates and projects. The preparation of lesson plans, teaching aids, other instructional materials and organization of co-curricular activities also formed a part of the course. Both the groups covered this part of the curriculum in the same way.

After the preparatory work for student teaching experience like preparation of the curriculum plan, teaching units, sample lesson plans, unit tests, etc., which was common to both the groups, the experimental group was shifted to the campus of a co-operating school. Arrangement for their boarding and lodging was made there to avoid contamination between the control and the experimental groups during CBT. At the same time, caution was taken not to allow the experimental group to grow the consciousness that this was a special arrangement. Nor were they told that the experiment was being conducted. They were told that this arrangement was being made to make their work convenient as the distances were too long and transport arrangement inadequate.

Pre-training Observation

During the first week of the student teaching programme, initial observation of the verbal classroom behaviour of student teachers in the control and experimental groups was done using FIACS. Each student teacher was observed twice for a time spell of thirty minutes each session. Pre-training scores of the classroom interaction variables were computed from the observational data.

Administering the Treatment

After taking initial measures of the classroom behaviour of the student teachers, the control group continued its programme of teaching in the conventional pattern. The experimental group was provided T_2, i.e., intensive CBT.

The first phase of the CBT was organised for forty hours spread over ten days. It provided to the student teachers grounding in the concept of teaching, classroom behaviour patterns as the basis of teaching, analysis of teaching, classroom teaching as an interactive process, the broad concept of classroom climate, etc. FIACS was also introduced to the student teachers. In this context, teaching style, teacher influence, responsiveness, flexibility of influence were explained. Ten categories with a number of illustrations explaining them were discussed in detail. Ground rules for recording observation were dealt with. Besides discussion, mimeographed material of FIACS was provided to the student teachers.

The situations presenting different categories were created through role play. Materials for the observation having been introduced to the group, recording was done in role play situations to start with. The concept of inter-observer reliability after Scott's coefficient of agreement was introduced and its computations were worked out. Preparation of 10 × 10 interaction analysis matrix followed further. The student teachers were introduced to its preparation and interpretation. After this, the group devoted one hour to observing classroom teaching in schools. Blind matrix analysis exercises proved to be quite useful as well as interesting. At the end of the training, some research using interaction analysis was discussed. There was a discussion on effective teaching behaviour patterns and a few exercises in modification of teaching behaviour taking up micro-situations were covered. The future programme of providing feedback based on interaction analysis to the student teachers was finalised.

The intensive CBT training described above was followed by feedback based on interaction analysis. The student teachers in the experimental group were assigned in pairs to the co-operating schools. One student teacher observed using FIACS, while the other gave the lesson and vice versa. Supervisors also observed the student teachers. The supervisor would give observational data to the student teacher observed, to prepare interaction matrix and compute classroom interaction variables. Every alternate day, the supervisor had individual discussion with the student teachers to provide feedback on the basis of the interaction analysis data from their matrices. They would fix up the target in each meeting for the lessons to follow, discuss the direction of change in the interaction patterns, and how this could be achieved. This type of feedback continued for six weeks.

Post-training Observation I

After the completion of the CBT, the student teachers in the control and the experimental groups were observed in two sessions of thirty minutes each using FIACS. Interaction variables were computed to study the change during the period of CBT in the experimental and control groups of student teachers. Pre-training and Post-training observation I provide data to test the first hypothesis.

Post-training Observation II

Treatment to the experimental group was stopped after the first post-training observation. The experimental group was provided no feedback. After two weeks, post-training observation II was taken to study the stability of the effect of CBT.

The Gap

The student teachers completed their training in December 1970. They were appointed by the Education Department and joined their assigned teaching positions in April, 1971. Thus during the period between December 1970 and April 1971, there was no treatment. Moreover, there was no teaching.

Post-training Observation III

As the student teachers joined their assigned teaching positions, their classes were observed again in two sessions of thirty minutes duration each. The student teachers taught English structures to class IV. " One teacher-one class " system was adopted to minimise, if not totally eliminate, other teachers influencing the pupils during experimentation. This measure served two purposes. Firstly, it helped in assessing the sustenance of the CBT for a longer period of time, and secondly, it served as a test of treatment fidelity during second phase of the study.

Pretest Performance of the Pupils on PAAS, PADS and PACTS

Synchronized with post-training observation III, PAAS, PADS and PACTS were administered to the pupils to obtain their pretest scores on these variables of pupil outcomes. These scores were used for adjusting post-test scores of the pupils for their initial performance on PAAS, PADS and PACTS through analysis of covariance.

Post-training Observation IV

After another eight weeks, the classes with the control and the experimental groups were observed again. This served two purposes—firstly, to provide for the study of sustenance and carry over of the CBT effects, and secondly, as a test of treatment fidelity for phase II of the study.

Post-test Performance of the Pupils

Synchronized with post-training observation IV, the pupils were administered PAAS, PADS, and PACTS. This provided for comparing the performance of the pupils under the experimental and the control groups of student teachers.

Statistical Analysis

To test the significance of difference between classroom interaction variable scores of the control and the experimental groups of student teachers after CBT, the post-test scores were adjusted for initial differences through 2 × 2 analysis of covariance. To test the significance of difference between the performance of the pupils under the experimental and the control groups of student teachers, post-test scores of pupils' performance were also adjusted for initial ability through 2 × 2 analysis of covariance. Scott's coefficient of agreement was calculated to assess inter-observer reliability.

RESULTS

(a) Classroom Behaviour Training

In this section, the data have been organised to test hypotheses 1 and 2 relating to the effect of CBT. Analysis of the data purported to answer such questions as: Did the experimental group act differently than the control group after the completion of CBT? If so, did it act differently in hypothesised direction?

Did the experimental group continue to act differently in the same direction, even after the two groups joined their teaching positions in schools, or in other words, did the experimental group sustain and carry over the effect of CBT to the teaching positions in schools they occupied after completing their training? To answer these questions, simple 2 × 2 analysis of covariance was carried out with a view to adjusting post-training scores on interaction variables for pre-training scores. This was done in respect of all the four post-training scores. Analysis of covariance of individual interaction variables is followed by a consolidated table of the results showing pre-training means, post-training means, adjusted means, F-values, corresponding 'P' values.

Post-training Scores I

Table 5 provides analysis of covariance of post-training scores (I) on the individual interaction variables, and Table 6 presents the consolidated position along with means.

TABLE 5

Analysis of Covariance of Post-training (I) with Pre-training Interaction Variable Scores

Interaction Variables	*Source of Variation*	*df*	*SS*	*MS*	*F*	*P*
MFR	Between groups	1	39.17	39.17	5.41	$P<0.05$
	Error	17	123.89	7.23		
	Total	**18**	**163.06**			
PTT	Between groups	1	29.89	29.89	9.57	$P<0.01$
	Error	17	54.28	3.19		
	Total	**18**	**84.17**			

TABLE 5 (Contd.)

Interaction Variables	*Source of Variation*	*df*	*SS*	*MS*	*F*	*P*
PPT	Between groups	1	119.81	119.81	8.48	$P<0.01$
	Error	17	239.72	14.12		
	Total	**18**	**359.53**			
PSC	Between groups	1	86.88	86.88	4.41	$P<0.05$
	Error	17	313.92	18.48		
	Total	**18**	**400.80**			
TRR	Between groups	1	63.82	63.82	8.85	$P<0.01$
	Error	17	123.68	7.28		
	Total	**18**	**187.50**			
TRR 89	Between groups	1	121.34	121.34	6.14	$P<0.05$
	Error	17	336.25	19.78		
	Total	**18**	**457.59**			
TQR	Between groups	1	48.69	48.69	7.93	$P<0.025$
	Error	17	104.32	6.14		
	Total	**18**	**153.01**			
TQR 89	Between groups	1	83.64	83.64	5.05	$P<0.05$
	Error	17	282.72	16.56		
	Total	**18**	**366.36**			
PIR	Between groups	1	57.23	57.23	5.29	$P<0.05$
	Error	17	184.47	10.85		
	Total	**18**	**241.70**			

TABLE 5 (Contd.)

Interaction Variables	*Source of Variation*	*df*	*SS*	*MS*	*F*	*P*
CCR	Between groups	1	121.19	121.19	6.81	$P<0.025$
	Error	17	298.77	17.58		
	Total	**18**	**419.96**			
SSR	Between groups	1	187.34	187.34	5.26	$P<0.05$
	Error	17	605.85	35.63		
	Total	**18**	**793.19**			
PSSR	Between groups	1	51.86	51.86	3.01	NS
	Error	17	293.47	17.21		
	Total	**18**	**345.33**			

TABLE 6

Comparison of the Control Group and the Experimental Group on Interaction Variables Immediately after CBT (Post-Training I)

Interaction Variables	*Group*	*Pre-training Mean*	*Post-training (I) Mean*	*ANACOVA Adjusted Mean*	*F*	*P*
MFR	Control	4.56	5.32	5.18	5.41	$P<0.05$
	Experimental	5.66	9.62	8.89		
PTT	Control	78.34	80.02	79.19	9.57	$P<0.01$
	Experimental	82.71	68.82	69.50		

TABLE 6 (Contd.)

Inter action Variables	*Group*	*Pre-training Mean*	*Post-training (I) Mean*	*ANACOVA Adjusted Mean*	*F*	*P*
PPT	Control	13.54	11.72	12.35	8.48	$P<0.01$
	Experimental	10.15	27.15	25.58		
PSC	Control	8.12	8.26	8.46	4.41	$P<0.05$
	Experimental	6.38	4.03	3.92		
TRR	Control	54.25	52.21	53.81	8.85	$P<0.01$
	Experimental	56.38	75.48	74.52		
TRR 89	Control	38.59	41.03	40.95	6.14	$P<0.05$
	Experimental	40.91	56.73	57.54		
TQR	Control	9.12	8.50	8.79	7.93	$P<0.025$
	Experimental	10.05	18.93	18.56		
TQR 89	Control	20.35	22.18	21.67	5.05	$P<0.05$
	Experimental	19.32	30.82	31.48		
PIR	Control	14.82	13.28	14.32	5.29	$P<0.05$
	Experimental	15.23	22.79	23.82		
CCR	Control	81.82	83.21	82.56	6.81	$P<0.025$
	Experimental	78.83	64.72	65.98		
SSR	Control	80.58	83.72	84.39	5.26	$P<0.05$
	Experimental	82.19	72.63	70.84		
PSSR	Control	51.82	49.17	48.34	3.01	NS
	Experimental	48.35	65.28	64.12		

An examination of Tables 5 and 6 reveals that after the CBT the experimental group did act differently compared to the control group. All, but one, interaction variables reached levels of significance ranging from 0.01 to 0.05. The difference between pre-training and post-training I scores on PSSR failed to reach level of significance. The experimental group scored higher on MFR, PPT, TRR, TRR 89, TQR, TQR 89 and PIR, and scored lower on PTT, PSC, CCR and SSR. The data support the first hypothesis which implies that the CBT was effective in producing significant changes in classroom interaction patterns of the experimental group, except in the case of PSSR.

Post-training Scores II

Analysis of covariance of the post-training II with pre-training scores on different interaction variables are given in Table 7 for comparing the two groups. Pre-training mean, post-training II mean, analysis of covariance adjusted mean, F-values and corresponding 'P' values form the content of Table 8.

TABLE 7

Analysis of Covariance of Post-training (II) with Pre-training Interaction Variable Scores

Interaction Variables	*Source of Variation*	*df*	*SS*	*MS*	*F*	*P*
MFR	Between groups	1	68.14	68.14	7.29	$P<0.025$
	Error	17	168.85	9.35		
	Total	**18**	**236.99**			
PTT	Between groups	1	47.88	47.88	8.69	$P<0.01$
	Error	17	93.76	5.51		
	Total	**18**	**141.64**			

TABLE 7 (Contd.)

Inter-action Vari-ables	*Source of Variation*	*df*	*SS*	*MS*	*F*	*P*
PPT	Between groups	1	34.64	34.64	8.51	P<0.01
	Error	17	69.29	4.07		
	Total	**18**	**103.93**			
PSC	Between groups	1	15.69	15.69	1.15	NS
	Error	17	232.45	13.62		
	Total	**18**	**248.14**			
TRR	Between groups	1	122.79	122.79	8.76	P<0.01
	Error	17	238.18	14.01		
	Total	**18**	**360.97**			
TRR 89	Between groups	1	86.71	86.71	5.31	P<0.05
	Error	17	274.31	16.13		
	Total	**18**	**361.02**			
TQR	Between groups	1	35.47	35.47	7.56	P<0.025
	Error	17	79.82	4.69		
	Total	**18**	**115.29**			
TQR 89	Between groups	1	51.82	51.82	5.51	P<0.05
	Error	17	169.87	9.40		
	Total	**18**	**221.69**			
PIR	Between groups	1	28.67	28.67	4.86	P<0.05
	Error	17	101.31	5.90		
	Total	**18**	**129.98**			

TABLE 7 (Contd.)

Interaction Variables	*Source of Variation*	*df*	*SS*	*MS*	*F*	*P*
CCR	Between groups	1	81.29	81.29	6.61	$P<0.025$
	Error	17	210.81	12.40		
	Total	**18**	**292.10**			
SSR	Between groups	1	144.92	144.92	5.75	$P<0.05$
	Error	17	428.59	25.21		
	Total	**18**	**573.51**			
PSSR	Between groups	1	86.24	86.24	3.21	NS
	Error	17	456.89	26.88		
	Total	**18**	**543.13**			

TABLE 8

Comparison of the Control Group and the Experimental Group on Interaction Variables a Fortnight after CBT (Post-training II)

Interaction Variables	*Group*	*Pre-training Mean*	*Post-training(II) Mean*	*ANACOVA Adjusted Mean*	*F*	*P*
MFR	Control	4.56	3.26	3.85	7.29	$P<0.025$
	Experimental	5.66	9.82	9.38		
PTT	Control	78.34	76.09	77.54	8.69	$P<0.01$
	Experimental	82.71	69.72	68.01		

TABLE 8 (Contd.)

Interaction Variables	*Group*	*Pre-training Mean*	*Post-training (I) Mean*	*ANACOVA Adjusted Mean*	*F*	*P*
PPT	Control	13.54	11.61	10.38	8.51	$P<0.01$
	Experimental	10.15	20.33	21.54		
PSC	Control	8.12	12.30	10.02	1.15	NS
	Experimental	6.38	9.95	10.89		
TRR	Control	54.25	52.18	53.28	8.76	$P<0.01$
	Experimental	56.38	73.82	91.97		
TRR 89	Control	38.59	41.43	40.25	5.31	$P<0.05$
	Experimental	40.91	55.19	56.82		
TQR	Control	9.12	8.72	8.32	7.56	$P<0.025$
	Experimental	10.05	17.35	18.58		
TQR 89	Control	20.35	19.18	17.69	5.51	$P<0.05$
	Experimental	19.32	27.53	26.02		
PIR	Control	14.82	16.92	16.37	4.86	$P<0.05$
	Experimental	15.23	21.37	22.68		
CCR	Control	81.82	77.26	78.85	6.61	$P<0.025$
	Experimental	78.83	65.48	64.32		
SSR	Control	80.58	82.83	81.20	5.75	$P<0.05$
	Experimental	82.19	73.34	72.02		
PSSR	Control	51.82	54.39	52.25	3.21	NS
	Experimental	48.35	66.54	65.35		

It will be seen from Tables 7 and 8 that the significant difference in the interaction patterns featuring the experimental and the control groups immediately after CBT were sustained two weeks after the training. Only one interaction variable PSC has become non-significant in addition to PSSR, which was not significant even in post-training I. The levels of significance of the other variables vary from 0.01 to 0.05. Ten out of the twelve interaction variables continued to be significantly different in the two groups.

Post-training Scores III

The experimental and the control groups were observed seventeen weeks after CBT in altogether a different situation. At this time the student teachers had joined their teaching positions in schools assigned by the education department. Table 9 presents analysis of covariance of post-training III with pre-training scores on individual interaction patterns. Pre-training, post-training and analysis of covariance adjusted means are given in Table 10 to compare the two groups.

TABLE 9

Analysis of Covariance of Post-training (III) with Pre-training Interaction Variable Scores

Interaction Variables	*Source of Variation*	*df*	*SS*	*MS*	*F*	*P*
MFR	Between groups	1	89.34	89.34	6.75	$P<0.05$
	Error	17	215.85	13.22		
	Total	**18**	**305.19**			
PTT	Between groups	1	63.47	63.47	7.51	$P<0.025$
	Error	17	143.68	8.45		
	Total	**18**	**207.15**			

TABLE 9 (Contd.)

Interaction Variables	*Source of Variation*	*df*	*SS*	*MS*	*F*	*P*
PPT	Between groups	1	78.34	78.34	8.77	P<0.01
	Error	17	151.86	8.83		
	Total	**18**	**230.20**			
PSC	Between groups	1	3.94	3.94	0.94	NS
	Error	17	71.23	4.17		
	Total	**18**	**75.17**			
TRR	Between groups	1	95.67	95.67	8.46	P<0.01
	Error	17	192.28	11.31		
	Total	**18**	**287.95**			
TRR 89	Between groups	1	101.34	101.34	4.85	P<0.05
	Error	17	358.84	21.11		
	Total	**18**	**460.18**			
TQR	Between groups	1	41.62	41.62	7.25	P<0.025
	Error	17	976.34	5.72		
	Total	**18**	**1017.96**			
TQR 89	Between groups	1	35.49	35.49	5.56	P<0.05
	Error	17	108.68	6.39		
	Total	**18**	**144.17**			
PIR	Between groups	1	51.34	51.34	4.53	P<0.05
	Error	17	192.59	11.32		
	Total	**18**	**243.93**			

TABLE 9 (Contd.)

Interaction Variables	*Source of Variation*	*df*	*SS*	*MS*	*F*	*P*
CCR	Between groups	1	103.82	103.82	7.77	P<0.025
	Error	17	224.74	13.22		
	Total	**18**	**328.56**			
SSR	Between groups	1	123.47	123.47	5.40	P<0.05
	Error	17	388.31	22.83		
	Total	**18**	**511.78**			
PSSR	Between groups	1	67.34	67.34	3.07	NS
	Error	17	374.82	22.05		
	Total	**18**	**442.16**			

TABLE 10

Comparison of the Control Group and the Experimental Group on Interaction Variables just after the Groups joined their Teaching positions in Schools (Post-training III)

Interaction Variables	*Group*	*Pre-training Mean*	*Post-training(III) Mean*	*ANACOVA Adjusted Mean*	*F*	*P*
MFR	Control	4.56	5.48	5.01	6.75	P<0.05
	Experimental	5.66	9.86	9.54		
PTT	Control	78.34	75.32	77.24	7.51	P<0.025
	Experimental	82.71	68.82	69.78		

TABLE 10 (Contd.)

Interaction Variables	*Group*	*Pre-training Mean*	*Post-training(II) Mean*	*ANACOVA Adjusted Mean*	*F*	*P*
PPT	Control	13.54	12.47	12.89	8.77	P<0.01
	Experimental	10.15	21.55	23.26		
PSC	Control	8.12	12.21	9.89	0.94	NS
	Experimental	6.38	9.63	10.06		
TRR	Control	54.25	50.92	52.01	8.46	P<0.01
	Experimental	56.38	68.35	70.08		
TRR 89	Control	38.59	43.34	41.32	4.85	P<0.05
	Experimental	40.91	52.83	54.28		
TQR	Control	9.12	11.52	10.54	7.25	P<0.02
	Experimental	10.05	17.38	17.02		
TQR 89	Control	20.35	19.53	18.42	5.56	P<0.05
	Experimental	19.32	27.89	28.13		
PIR	Control	14.82	14.38	16.35	4.53	P<0.05
	Experimental	15.23	21.75	21.34		
CCR	Control	81.82	84.05	83.24	7.77	P<0.025
	Experimental	78.83	66.28	64.57		
SSR	Control	80.58	84.68	81.59	5.40	P<0.05
	Experimental	82.19	70.38	72.58		
PSSR	Control	51.82	48.21	50.13	3.07	NS
	Experimental	48.35	63.12	61.82		

An examination of Tables 9 and 10 reveals that the significant differences in respect of the interaction variables that marked the experimental and the control groups after post-training II, persist after seventeen weeks as well. The level of significance, in respect of two variables, however, showed a decline. The level of significance of PTT fell from 0.01 to 0.025 and the level of significance of MFR fell from 0.025 to 0.05. PSC and PSSR remained non-significant at this stage as well. This implies that the effects of CBT are retained by the student teachers even after seventeen weeks of its imparting. Another notable fact revealed by the present analysis is that the effects of CBT produced in the experimental group during their student teaching experience, were not confined to their performance in training institute only, but were carried over to actual teaching performance, when they joined schools after completing their training. The data support the second hypothesis and answer the second question that was posed in the beginning of the present section.

TABLE 11

Analysis of Covariance of Post-training (IV) with Pre-training Interaction Variable Scores

Interaction Variables	*Source of Variation*	*df*	*SS*	*MS*	*F*	*P*
MFR	Between groups	1	63.47	63.47	6.13	$P<0.05$
	Error	17	175.82	10.34		
	Total	**18**	**239.29**			
PTT	Between groups	1	108.32	108.32	6.22	$P<0.05$
	Error	17	295.84	17.40		
	Total	**18**	**404.16**			

TABLE 11 (Contd.)

Interaction Variables	*Source of Variation*	*df*	*SS*	*MS*	*F*	*P*
PPT	Between groups	1	54.89	54.89	7.51	P<0.025
	Error	17	124.38	7.31		
	Total	**18**	**179.27**			
PSC	Between groups	1	2.47	2.47	0.71	NS
	Error	17	58.69	3.45		
	Total	**18**	**61.16**			
TRR	Between groups	1	68.39	68.39	8.62	P<0.01
	Error	17	135.84	7.93		
	Total	**18**	**204.23**			
TRR 89	Between groups	1	76.37	76.37	4.59	P<0.05
	Error	17	282.84	16.61		
	Total	**18**	**359.21**			
TQR	Between groups	1	55.31	55.31	7.42	P<0.025
	Error	17	126.67	7.45		
	Total	**18**	**181.98**			
TQR 89	Between groups	1	28.64	28.64	5.62	P<0.05
	Error	17	86.29	5.09		
	Total	**18**	**114.93**			
PIR	Between groups	1	33.87	33.87	4.70	P<0.05
	Error	17	121.39	7.14		
	Total	**18**	**155.26**			

TABLE 11 (Contd.)

Interaction Variables	*Source of Variation*	*df*	*SS*	*MS*	*F*	*P*
CCR	Between groups	1	87.74	87.74	7.37	P<0.025
	Error	17	203.34	11.80		
	Total	**18**	**291.08**			
SSR	Between groups	1	103.84	103.84	5.37	P<0.05
	Error	17	328.25	18.31		
	Total	**18**	**432.09**			
PSSR	Between groups	1	42.68	42.68	2.38	NS
	Error	17	304.54	17.88		
	Total	**18**	**347.22**			

Post-training Scores IV

Last of all, the experimental and the control groups were again observed during the second phase of the study after a lapse of twenty-six weeks. Analysis of covariance of post-training IV with pre-training scores on individual interaction variables are given in Table 11. Pre-training, post-training IV and analysis of covariance adjusted means, with F-values and corresponding 'P' values are given in Table 12. Tables 11 and 12 provide further evidence to test the second hypothesis.

TABLE 12

Comparison of the Control Group and the Experimental Group on Interaction Variables after Twenty-four weeks of CBT (Post-training IV)

Interaction Variables	*Group*	*Pre-training Mean*	*Post-training(IV) Mean*	*ANACOVA Adjusted Mean*	*F*	*P*
MFR	Control	4.56	4.07	4.01	6.13	P<0.05
	Experimental	5.66	8.98	9.20		

TABLE 12 (Contd.)

Interaction Variables	*Group*	*Pre-training Mean*	*Post-training(IV) Mean*	*ANACOVA Adjusted Mean*	*F*	*P*
PTT	Control	78.34	76.89	78.25	6.22	$P<0.05$
	Experimental	82.71	68.01	70.12		
PPT	Control	13.54	13.15	12.54	7.51	$P<0.025$
	Experimental	10.15	19.66	20.15		
PSC	Control	8.12	9.96	9.21	0.71	NS
	Experimental	6.38	12.33	10.32		
TRR	Control	54.25	56.21	55.89	8.62	$P<0.01$
	Experimental	56.38	68.72	68.91		
TRR 89	Control	38.59	40.68	39.28	4.59	$P<0.05$
	Experimental	40.91	50.86	51.67		
TQR	Control	9.12	10.53	10.87	7.42	$P<0.025$
	Experimental	10.05	15.68	15.62		
TQR 89	Control	20.35	18.34	19.06	5.62	$P<0.05$
	Experimental	19.32	25.97	25.58		
PIR	Control	14.82	15.76	14.81	4.70	$P<0.05$
	Experimental	15.23	20.89	20.46		
CCR	Control	81.82	82.67	83.54	7.37	$P<0.025$
	Experimental	78.83	61.68	61.03		
SSR	Control	80.58	82.23	83.05	5.37	$P<0.05$
	Experimental	82.19	71.34	71.56		
PSSR	Control	51.82	48.89	49.76	2.38	NS
	Experimental	48.35	60.18	58.54		

Tables 11 and 12 support the results contained in Tables 9 and 10. The experimental and the control groups differ significantly on ten out of twelve interaction variables even twenty-six weeks after CBT, the levels of significance varying from 0.01 to 0.05. The second hypothesis is further supported. The findings are in agreement with those of Ober (1967), who observed student teachers from 4 to 12 months after training in interaction analysis and still found the experimental and the control groups differing in their verbal behaviour patterns in the classroom, with the only difference that Ober (1967) observed his student teachers during their training, while in this study they were observed after the completion of their training in their assigned positions in the teaching profession. This particular finding of the study is significant, as it provides evidence that differential teacher education treatments produce different classroom behaviour patterns in the prospective teachers.

Post-training Trends in Interaction Patterns

Table 13 given below includes the pre-training and post-training adjusted means of both the experimental and control groups in respect of the twelve interaction variables.

TABLE 13

Pre-training and Post-training Adjusted Means of the Twelve Interaction Variables for both the Control Group and the Experimental Group

Interaction Variables	*Group*	*Pre-training Mean*	*Post-training I Adjusted Mean*	*Post-training II Adjusted Mean*	*Post-training III Adjusted Mean*	*Post-training-IV Adjusted Mean*
MFR	Control	4.56	5.18	3.85	5.01	4.01
	Experimental	5.66	8.89	9.38	9.54	9.20
PTT	Control	78.34	79.19	77.54	77.24	78.25
	Experimental	82.71	69.50	68.01	69.78	70.12

TABLE 13 (Contd.)

Interaction Variables	*Group*	*Pre-training Mean*	*Post-training I Adjusted Mean*	*Post-training II Adjusted Mean*	*Post-training III Adjusted Mean*	*Post-training IV Adjusted Mean*
PPT	Control	13.54	12.35	10.38	12.89	12.54
	Experimental	10.15	25.58	21.54	23.26	20.15
PSC	Control	8.12	8.46	10.02	9.89	9.21
	Experimental	6.38	3.92	10.89	10.06	10.32
TRR	Control	54.25	53.81	53.28	52.01	55.89
	Experimental	56.38	74.52	91.97	70.08	68.91
TRR 89	Control	38.59	40.95	40.25	41.32	39.28
	Experimental	40.91	57.54	56.82	54.28	51.67
TQR	Control	9.12	8.79	8.32	10.54	10.87
	Experimental	10.05	18.56	18.58	17.02	15.62
TQR 89	Control	20.35	21.67	17.69	18.42	19.06
	Experimental	19.32	31.48	26.02	28.13	25.58
PIR	Control	14.82	14.32	16.37	16.35	14.81
	Experimental	15.23	23.82	22.68	21.34	20.46
CCR	Control	81.82	82.56	78.85	83.24	83.54
	Experimental	78.83	65.98	64.32	64.57	61.03
SSR	Control	80.58	84.39	81.20	81.59	83.05
	Experimental	82.19	70.84	72.02	72.58	71.56
PSSR	Control	51.82	48.34	52.25	50.13	49.76
	Experimental	48.35	64.12	65.35	61.82	58.54

Based on the means given in Table 13, profiles of the control group and the experimental group in respect of the twelve interaction variables were drawn to study post-training trends. The observations made on these profiles regarding post-training trends in interaction patterns which can also be made by studying the means in Table 13 are given below.

Miller Flexibility Ratio (*MFR*)*:* It was found that the experimental group mean on MFR was higher right from pre-training, through post-training I, to post-training III. The control group showed an irregular trend during the four post-training observations, while the experimental group showed a sharp improvement in post-training I, gradual improvement during post-training II and III, and a slight decline during post-training IV.

Percent Teacher Talk (*PTT*)*:* The PTT was intended to be lowered through CBT. The experimental group evinced a sharp decline in post-training I, further gentle decline in post-training II, and gradual upward trend during post-training III and IV. In the control group, PTT again showed an irregular trend.

Percent Pupil Talk (*PPT*)*:* With regard to the variable PPT, an irregular trend was observed in both the groups. This might be possible due to variation in the teaching content as well. But the experimental group, appeared to show a tendency to relapse into the original behaviour, not reaching significance.

Percent Silence or Confusion (*PSC*)*:* The experimental group declined in post-training I, went up in post-training II and remained almost the same during post-training III and IV. Was it because almost ten percent of Silence or Confusion is the optimum required in various lessons? This comes very near to the norms mentioned by Flanders (1970). Probably, the relapse may be attributable to this cause.

Teacher Response Ratio (*TRR*)*:* Teacher Response Ratio showed a steady decline in the case of the experimental group after post-training I, without reaching significance. The magnitude of decline was also not large. The control group showed usual irregular trend.

Instantaneous Teacher Response Ratio (*TRR* 89)*:* It was found that the experimental group improved when measured in post-training I, and during subsequent measurements, it showed a gentle decline without reaching significance.

Teacher Question Ratio (TQR): With regard to the variable TQR, there appeared to be a tendency on the part of the experimental group to relapse into the original interaction pattern without reaching significance, as the group showed a decline after post-training I and II. Fluctuation in the control group was very small.

Instantaneous Teacher Question Ratio (TQR 89): It was revealed that the trends with respect to TQR 89 were irregular in the case of the experimental group. The scores improved as a result of training, declined in post-training II, improved again in post-training III, and came to the level of post-training II during post-training IV. The fluctuation did not reach significance level. The variation might be due to the nature of the lessons taught. In the studies to be taken up after this, it is considered desirable to keep the content and objectives of the lessons also constant. In this study, the subject and units were kept constant.

Pupil Initiation Ratio (PIR): It was found that the experimental group was higher than the control group on PIR. The experimental group improved due to training, but showed a gentle decline during post-training measurements II, III and IV without reaching significance. There appeared to be a tendency on the part of the experimental group to relapse. This is the one variable which can be considered as pupil outcome variable as well. The configuration of the interaction patterns engendering the experimental group appeared to encourage and elicit higher pupil initiation than the configuration of interaction patterns featuring in the control group.

Content Cross Ratio (CCR): It is a variable, on which, no feedback was provided. The purpose was to see what happens to this variable when teacher responsiveness, accepting behaviour, and flexibility of influence in the classroom, improve. It was found that the control group showed an irregular trend, while the experimental group showed a steady decline. The same type of results have been reported by other researchers as well (Flanders, 1969).

Steady State Ratio (*SSR*) *:* The experimental group showed a decline in the hypothesised direction in case of SSR, as revealed by pre-training and post-training I observations. After post-training I, it showed a gentle upward trend which might be attributable to chance, as the trend did not reach significance.

Pupil Steady State Ratio (*PSSR*) *:* It was one of the two variables, on which, the experimental group, despite higher score than the control group, did not reach significance at an acceptable level *i.e.*, 0.05 level. There can be two reasons for the same. One reason can be that the two groups score almost equally and there may be very small differences. This, obviously, does not appear to be a valid reason, as the difference of means between the two was almost of the same magnitude as in case of other variables reaching significance. Another reason can be that inter-teacher variance may be large. As this forms the denominator in calculating ' F ', the value of ' F ' will remain small. The higher variance may be considered responsible for keeping this variable from reaching significance despite the differences between the means.

Discussion

Several points emerge from examination of the data and the results presented earlier. In the first place, it appears feasible to develop the desired classroom interaction patterns in prospective teachers, if appropriate strategy is employed in their training. Classroom Behaviour Training, based on interaction analysis, used in the present study may be considered as one of the strategies which have been found to be more effective in accomplishing the above objective as compared to the conventional programme of student teaching offered to the prospective teachers. The experimental group, at the end of their student teaching experience, talked less, was more responsive to pupils, encouraged more pupil participation and even initiation during the classroom discourse and had more flexibility in classroom influence than the control group (Tables 5 to 12). The results are in agreement with findings reported by Amidon and Powell

(1966), Amidon and others (1967), Ober (1967), Hill (1967), Davidson (1968), Pareek and Rao (1971 a), and Pangotra (1971). This implies that *Classroom Behaviour Training, based on interaction analysis, can be used as one of the training strategies effectively, once the conceptual basis of the interaction patterns is prepared, it is operationalized into the behaviour patterns, an objective, reliable and valid system of observation of classroom teaching is developed, the prospective teachers are oriented to the system, and provide intensive feedback to acquire the target classroom patterns.*

Secondly, the interaction patterns acquired during the training, were sustained even seventeen to twenty-six weeks after the training was completed in altogether a new situation, when the prospective teachers assumed charge of their designated teaching positions in the education department. In other words, the behaviour patterns acquired during their student teaching in the training institute were not confined to the training institute alone, but the prospective teachers carried these interaction patterns to the actual field of teaching in schools they joined after the completion of their training. This establishes a closer relationship between the teacher education programme and subsequent performance of its products in the field (Tables 9 to 12). This augurs well for teacher education. In brief, *the effects of intensive Classroom Behaviour Training are sustained and carried over to the actual teaching in the field.*

In most of the interaction variables, after initial improvement in the hypothesised direction, a declining trend without reaching significance is discernible. Is it that the experimental group teachers (earlier student teachers) will relapse into their original behaviour patterns after a further lapse of time? If so, after how much time and why? Will all of them relapse or only a few? Is the relapse related to some institutional characteristics like organisational climate, academic climate, cultural influences, etc.? If so, what type of teachers, in what type of institutions, and under what conditions will relapse? These questions can be answered by further empirical research. Our reason may be that the student teachers joined their teaching positions in schools three months after completing their training. There was no teaching work during this period due to winter vacation and they had no opportunity to teach. This may have affected their interaction patterns. But if this contention is accepted, the interaction patterns should have shown improvement in post-training IV observation, since they had taught for two months by that time. Another reason can be that there was no feedback to them during their teaching in the schools and so they could not exactly assess their classroom performance objectively. This appears to be a more viable reason. Probably, training in " self-inquiry projects " on the pattern suggested by Flanders (1970) may be more effective if employed as a part of Classroom Behaviour Training. In that case, the student teachers trained in interaction analysis may be appointed in pairs as far as possible, so that the inquiry projects requiring each other's observation of classroom teaching can be carried on. By way of conclusion, the relapse problem needs serious investigation and search for ways and means to check it.

(b) Classroom Behaviour Training and Pupil Performance

The experimental and the control groups of teachers assumed charge of their assigned teaching positions in the profession after completing their training in the institute. All of them were assigned class IV following " one class—one teacher " system in order to minimise, if not to eliminate totally, other teachers influencing the pupils during second phase of the study. The headmasters and the inspectors were approached with a request not to directly influence the classroom teaching of these teachers. They responded positively.

In order to test the third hypothesis, which states that pupils under the experimental group of student teachers will perform better than pupils under the control group on PAAS, PADS, and PACTS, the pupils were measured twice on the three variables, once immediately after the student teachers joined their respective teaching positions in schools, synchronizing with post-training observation III and again after a period of eight weeks synchronizing with post-training observation IV. Tables 5 to 12 in the preceding section show that the experimental and the control groups differed significantly on interaction variables in hypothesised direction, thus demonstrating treatment fidelity to some extent. A 2 × 2 analysis of covariance was carried out to adjust post-test scores for initial scores of the pupils to test the hypothesis. The adjusted average performance of the pupils and analysis of covariance have been given in Tables 14 to 27.

Adjustment to Home

TABLE 14

Pretest, Post-test and ANACOVA Adjusted Means (PAAS—Home)

Group	*Pretest Mean*	*Post-test Mean*	*ANACOVA Adjusted Mean*	*N*
Control	4.65	4.21	4.46	185
Experimental	4.26	6.12	6.31	213

TABLE 15

Analysis of Covariance of Post-test (PAAS—Home) Adjusted for Initial Scores

Source of Variation	*df*	*SS*	*MS*	*F*	*P*
Between groups	1	6.38	6.38	2.44	Not Significant
Error	395	1021.78	2.61		
Total	**396**	**1028.16**			

Scores on PAAS (Home) range from — 10 to + 10. Scores between 0 and + 5 show adjustment, scores above + 5 show high adjustment, and negative (—) scores show maladjustment. Tables 14 and 15 indicate that the experimental and the control groups differ in the hypothesised direction, but not significantly. This may be due to the fact that the pupils already showed adjustment, as the average scores in Table 14 indicate, and improvement in the performance of the experimental group might have failed to reach significance.

Adjustment to School

TABLE 16

Pretest, Post-test and ANACOVA Adjusted Means (PAAS—School)

Group	*Pretest Mean*	*Post-test Mean*	*ANACOVA Adjusted Mean*	*N*
Control	0.97	1.05	1.07	185
Experimental	0.85	3.81	3.97	213

TABLE 17

Analysis of Covariance of Post-test (PAAS—School) Adjusted for Initial Scores

Source of Variation	*df*	*SS*	*MS*	*F*	*P*
Between groups	1	5.67	5.67	4.32	P<0.05
Error	395	511.48	1.29		
Total	**396**	**517.15**			

The theoretical range of scores on the scale of adjustment towards school is from — 10 to + 6, with 0 as the cutpoint between adjustment (+), and maladjustment (—) scores. Scores below — 5 show high maladjustment, while scores above + 3 show high adjustment. The pretest average shows just adjustment towards the school. During eight weeks of second phase of the study, the adjusted average of the experimental group improved to 3.97 showing higher adjustment towards school, reaching significance level of 0.05.

Adjustment Towards Peers

TABLE 18

Pretest, Post-test and ANACOVA Adjusted Means (PAAS—Peers)

Group	*Pretest Mean*	*Post-test Mean*	*ANACOVA Adjusted Mean*	*N*
Control	1.89	1.97	1.77	185
Experimental	1.63	4.03	4.23	213

TABLE 19

Analysis of Covariance of Post-test (PAAS—Peers) Adjusted for Initial Scores

Source of Variation	*df*	*SS*	*MS*	*F*	*P*
Between groups	1	3.59	3.59	3.78	P<0.10
Error	395	367.35	.93		
Total	**396**	**370.94**			

The theoretical range of the scores on PAAS (Peers) extends from — 10 to + 6. Scores + 3 and above show high adjustment. The initial scores on the scale of pupil adjustment to peers show the groups fairly adjusted. The experimental and the control groups differ at 0.10 level of significance, the experimental group showing higher performance. The lower level of significance may be due to fair initial adjustment of the two groups, as is evident from Table 18.

TABLE 20

Pretest, Post-test and ANACOVA Adjusted Means (PAAS—Teacher)

Group	*Pretest Mean*	*Post-test Mean*	*ANACOVA Adjusted Mean*	*N*
Control	1.23	1.15	1.19	185
Experimental	1.18	3.98	3.87	213

TABLE 21

Analysis of Covariance of Post-test (PAAS—Teacher) Adjusted for Initial Scores

Source of Variation	*df*	*SS*	*MS*	*F*	*P*
Between groups	1	8.38	8.38	5.20	$P<0.05$
Error	395	635.95	1.61		
Total	**396**	**644.33**			

The theoretical range of the scores of adjustment towards teacher lies between — 10 to + 6. The initial scores in Table 20 indicate that the pupils in the two groups were less adjusted to teachers than towards peers. As a result of teaching for eight weeks, the experimental group differed from the control group at 0.05 significance level. This may be due to the direct relationship between teacher responsiveness and the encouragement he provided for pupil participation and initiation in the classroom, and pupil adjustment to teacher.

General Adjustment

TABLE 22

Pretest, Post-test and ANACOVA Adjusted Means (PAAS—General)

Group	*Pretest Mean*	*Post-test Mean*	*ANACOVA Adjusted Mean*	*N*
Control	2.38	2.32	2.49	185
Experimental	2.21	4.76	4.66	213

TABLE 23

Analysis of the Covariance of Post-test (PAAS—General) Adjusted for Initial Scores

Source of Variation	*df*	*SS*	*MS*	*F*	*P*
Between groups	1	13.36	13.36	4.11	P<0.05
Error	395	1265.67	3.20		
Total	**396**	**1278.03**			

The theoretical limits of general adjustment scores lie between − 6 to + 6, with 0 as cutpoint between adjustment and maladjustment. The initial scores show fair adjustment of both the groups. During the eight weeks of the experimental treatment, the experimental group showed higher improvement on the scores of general adjustment, the difference being significant at 0.05 level.

Independence

TABLE 24

Pretest, Post-test and ANACOVA Adjusted Means (PADS)

Group	*Pretest Mean*	*Post-test Mean*	*ANACOVA Adjusted Mean*	*N*
Control	4.35	4.97	5.12	185
Experimental	4.68	12.56	12.32	213

TABLE 25

Analysis of Covariance of Post-test (PADS) Adjusted for Initial Scores

Source of Variation	*df*	*SS*	*MS*	*F*	*P*
Between groups	1	9.61	9.61	5.08	$P<0.05$
Error	395	746.55	1.89		
Total	**396**	**756.16**			

The theoretical range of scores on PADS extends from 0 to 20, with 10 as the neutral point. The initial scores of the experimental and the control groups of the pupils, as Table 24 indicates, are below the neutral point. This implies that their level of independency was below average and dependency level above average. After the experimental treatment, the situation was reversed. The experimental group scored higher on independency and lower on dependency. The difference between the control and the experimental groups is significant at 0.05 level.

Classroom Trust

TABLE 26

Pretest, Post-test and ANACOVA Adjusted Means (PACTS)

Group	*Pretest Mean*	*Post-test Mean*	*ANACOVA Adjusted Mean*	*N*
Control	19.83	18.95	19.26	185
Experimental	17.68	25.69	25.31	213

TABLE 27

Analysis of Covariance of Post-test (PACTS) Adjusted for Initial Scores

Source of Variation	*df*	*SS*	*MS*	*F*	*P*
Between groups	1	16.32	16.32	4.06	$P < 0.05$
Error	395	1589.87	4.02		
Total	**396**	**1606.19**			

The classroom trust scores have a theoretical range of 8 to 32 with 20 as the midpoint. Initial scores of the experimental and the control groups reach the midpoint. The experimental group, however, gained on PACTS scores during the experimental treatment period, the difference between the two groups being significant at 0.05 level.

An examination of the results in Tables 14 to 27 reveals that the pupils under the experimental group performed better than the pupils under the student teachers of the control group in three areas out of five on PAAS, the differences in PAAS (Home) being not significant and in PAAS (Peers) reaching a significance level of only 0.10. The experimental group also performed better than the control group on PADS and PACTS. In other words, if the teachers are more responsive, encourage more pupil participation and initiation, and have more flexibility in the classroom behaviour patterns; or alternatively, they have the configuration of interaction patterns that the experimental group in the present study had; there is a likelihood that the pupils under their stewardship will have better adjustment towards the school, the teacher, the peers, the home, and will have better general adjustment; and they are likely to have less dependency and higher classroom trust level. In this way, CBT in general, and the interaction patterns exhibited by the student teachers in particular, are related to the pupils' performance on the three product variables forming a part of this study. The data support the third hypothesis. The findings, however, cannot be generalised, but the results are promising. There is a need to carry out controlled experiments, replicating the process-product part of this study, so as to gather sufficient data for making generalisations useful to understand and improve teaching.

Summary, Conclusions, and Implications

The purpose of the study, as indicated earlier, was threefold. Firstly, it examined the effectiveness of CBT based on interaction analysis vis-a-vis conventional programme of student teaching, in developing responsiveness, indirectness and flexibility of teacher influence in the student teachers, since current literature on teacher effectiveness reports relationship between these classroom interaction patterns and measures of pupil outcome. Secondly, the study attempted to investigate whether the student teachers sustain and carry over the classroom interaction patterns, learnt in the training institute, to their actual teaching performance, when they assume charge of their assigned positions in the teaching profession. Lastly, it sought to study the relationship between CBT imparted to the student teachers and performance of pupils under their charge, on adjustment to home, school, teacher, and peers; their dependency level; and classroom trust behaviour.

The study employed pretest, post-test and control group design in two phases controlling fourteen variables. Twenty student teachers and 398 pupils in their classes formed the sample. In the first phase, the experimental group of ten student teachers received (CBT) for eight weeks, while the control group continued with its conventional programme of student teaching. Pre-training and Post-training observations of the two groups of student teachers were obtained and analysed using 2 × 2 covariance analysis, adjusting post-training scores on classroom interaction patterns for pre-training scores. Three more post-training observations at different intervals were treated in the same way. In the second phase, pretest post-test scores of pupils under the charge of the two groups of student teachers on PAAS, PADS and PACTS were obtained and 2 × 2 analysis of covariance, adjusting post-test scores for their initial ability, was carried out.

The main findings of the study can be summarised as below :

1. CBT does change classroom interaction patterns of the student teachers, as is evident from the significant differences found in interaction pattern scores of the experimental and the control groups of student teachers.

2. After student teaching, the student teachers with CBT, score significantly higher on classroom interaction variables, *viz.*, PPT, TRR, TQR, TRR, TQR 89, PIR and MFR and score significantly lower on PTT, PSC, CCR, and SSR, than student teachers with a conventional programme of student teaching.

3. The student teachers with CBT score higher on PSSR than the student teachers with conventional programme of student teaching, but the differences are not found to be significant.

4. In post-training I, the student teachers with CBT, score significantly lower on PSC as hypothesised than the group of student teachers with conventional programme of student teaching. But the difference becomes non-significant in post-training measurements.

5. The student teachers with CBT sustain significant differences on classroom interaction patterns as compared to student teachers with conventional programme of student teaching even after twenty-six weeks of their training.

6. Although the student teachers with CBT maintained significant differences on ten out of twelve interaction pattern scores, an examination of the means shows a slight tendency to decline in the significance level particularly in the last two measurements.

7. The pupils under the student teachers with CBT score higher on adjustment to school, adjustment to teacher,

general adjustment, independency and classroom trust than pupils under the student teachers with conventional programme of student teaching.

8. The pupils under the student teachers with CBT score higher on adjustment to home and to peers than the pupils under the student teachers with conventional programme of student teaching. The differences are not found to be significant.

Conclusions

On the basis of the findings of the present study, a few conclusions can be drawn. Firstly, it is possible to modify the classroom interaction patterns of student teachers along the desired lines with a suitable teacher education programme. CBT based on interaction analysis, as used in the present study, is more effective than the conventional programme of student teaching in this respect. Secondly, most of the classroom interaction patterns acquired by student teachers during their training based on CBT are likely to be sustained and carried to the actual field of operation when the student teachers assume charge of their assigned positions in the teaching profession. Thirdly, the configuration of interaction patterns based on teacher responsiveness, indirectness, and flexibility appear to be related to better educational outcomes in this study in the area of adjustment. Lastly, this type of studies should be replicated, new ways of CBT be explored and teacher education programmes as well as programmes of instructional improvement in the country be reviewed in the light of the knowledge thus gained.

Implications

On the basis of the findings and the conclusions reported above, some specific implications for teacher education, teaching and research in the area are outlined in this section.

Teacher Education : The findings regarding CBT indicate favourable results. If the results are viewed in conjunction with the 'presage-process' studies reviewed earlier, they reveal that if the teachers or student teachers know the teaching concept operationalised in terms of teaching behaviour patterns, if they know how to analyse their own teaching behaviour patterns, if they can formulate hypotheses about the teaching behaviour patterns for the educational outcomes they want to engender in their pupils, and if they are provided with objective specific feedback regarding their observed teaching behaviour, there is a likelihood that they will modify their teaching behaviour accordingly. CBT based on interaction analysis is one such training programme. This has been tried out with live observers because still we are not in a position to provide sophisticated mechanical gadgets in the classrooms. It is not costly in terms of the material resources. Only human resources have to be mobilised and duly trained. Financial resources are required in as much as they are needed for training the personnel in the technique.

The system of interaction analysis used in this study has implications for the supervision of student teaching as well. Here is a tool which can provide objective and specific feedback to student teachers about their teaching behaviour in contrast to the vague feedback the supervisors provide at present. The tool can be modified to suit the purpose, if needed. A modified system of interaction analysis, combining effective as well as cognitive aspects of teaching, developed by Jangira (1971 a), is being tried out. There appears to be a rationale and the need for such efforts, if teacher education programmes are to be made more effective.

One of the findings indicate the tendency of the student teachers to relapse into the original teaching behaviour patterns as the time passes. This may be due to the lack of periodical feedback needed by the teacher to analyse and evaluate his own teaching behaviour patterns. Two things are suggested to make CBT programme more effective in the field. Firstly " scientific inquiry projects ", mentioned by Flanders (1970) may be included and tried out in future CBT. It appears that these kinds of projects will develop a scientific spirit amongst the teachers to study and carry out modification of their teaching behaviour as per their needs. Secondly, till sufficient number of teachers are trained in interaction analysis, as far as possible, the student teachers with CBT may be assigned teaching positions in pairs, so that they can arrange for mutual feedback based on actual classroom observations continuously.

The study provides a model to evaluate teacher education programmes in terms of subsequent teaching performance of student teachers and link it to pupil performance, which is the ultimate goal of teacher education. The models of evaluation of teacher education programmes may be designed as per needs, but here is an attempt to evaluate a part of the teacher education programme, *i.e.*, student teaching. Turner (1971) and Rosenshine (1971) also stress the need for this type of work to validate our ad hoc teacher education programmes.

Contribution to Teaching : The present study helps teaching in two ways. Firstly, it tells the teachers how to modify their teaching behaviour. Secondly, it provides a configuration of teaching behaviour patterns that appears to be related to better pupil outcomes. For example, they know that if their behaviour patterns conform to responsiveness, indirectness, and flexibility of influence in the classroom, pupil adjustment improves. In conjunction with other "process-product" studies reviewed earlier, this study contributes to the knowledge of teacher effectiveness.

Research on Teaching : The study has provided knowledge about improving student teaching practices and teacher effectiveness to a limited extent. Some anticipations from future research are natural. The conceptual image of the classroom teaching may be visualised as presented in figure I.

As is evident from the above figure, the present study touches only very limited aspects. The exhaustive reviews on research on teaching appearing in the volumes of Encyclopaedia of Educational Research, Review of Educational Research, Gage (1963 a), and Smith (1971) reveal that we have touched only

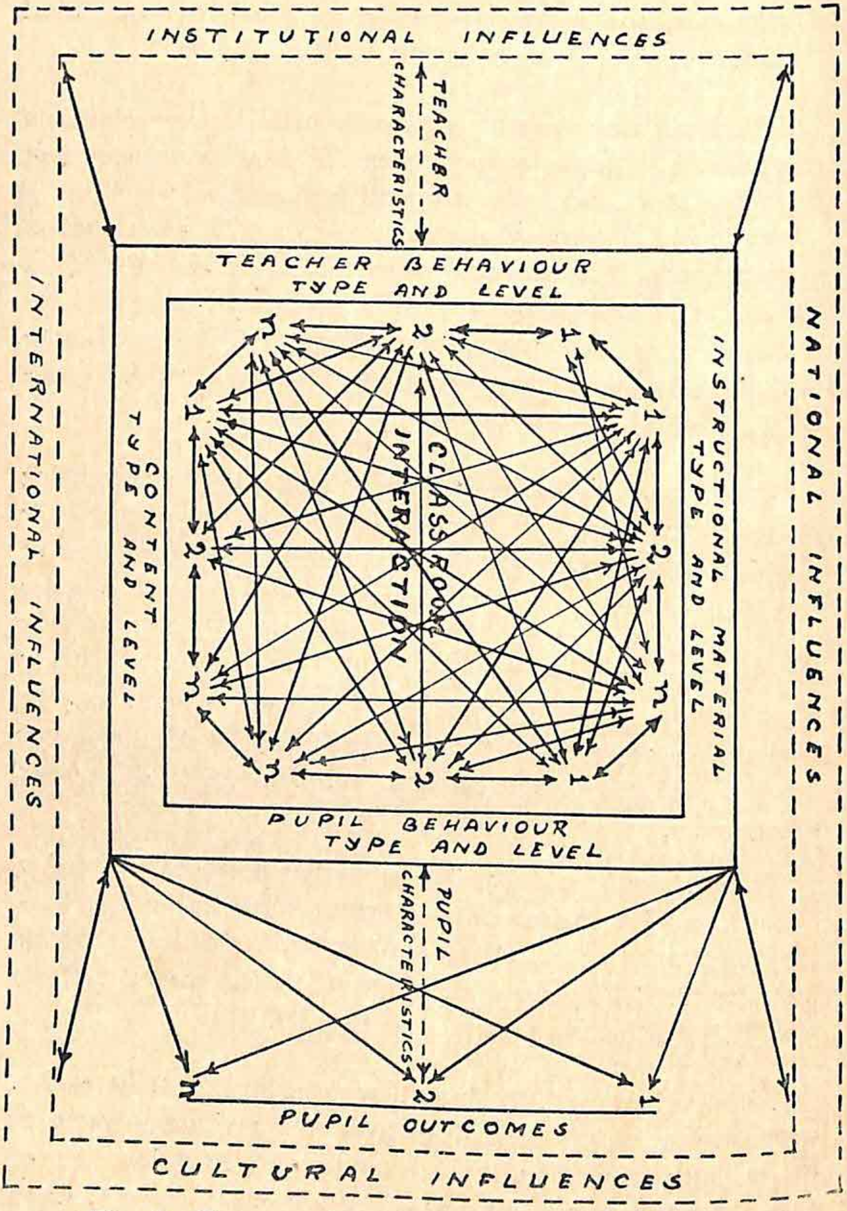

Fig. 1 Conceptual Model of Classroom Interaction.

a fringe of this complex problem. Concerted systematic attempts will have to be made if the challenge of teaching is to be met adequately. Some of the problems and directions of research are indicated below :

(i) This study tried out one strategy of CBT as a means of developing the target teaching behaviour patterns. Improvement in CBT to increase its effectiveness further either by way of economising the efforts and resources to be expended in the process, or by way of developing more broad based and insight based teaching behaviour patterns may be developed and tried out.

(ii) Systematic studies to evaluate effectiveness of the prevalent programmes of teacher education in terms of ultimate outcomes, as envisaged in this study, may be taken up by various agencies and institutions, which will provide data for improvement of the existing teacher education programmes.

(iii) This study and the studies reviewed earlier have neither explored nor identified all the relationships between teaching behaviour patterns and educational outcomes. Probably, more correlational studies generating new hypotheses and controlled experiments to validate or reject the generated hypotheses will have to be taken up. In this study, instructional materials could not be controlled in the second phase. Future studies may attempt in this direction to gain further insight. Studies by Wright and Nuthall (1970) and Church (1971) are examples of systematic attempts in this direction.

(iv) The present study had teacher as the sampling unit and adjustment for initial ability was made through analysis of covariance. It will be worthwhile to initiate a few studies based on pupil sampling on the basis of their ability and study the classroom interaction patterns. This may provide further insight into the problem.

(v) This study used " low inference " level variables of classroom interaction. Rosenshine and Furst (1971) point out some promising results from studies using " high inference " level variables also. It may be worthwhile to include both types of variables in some studies and see the relative effectiveness of the two.

These are some of the problems, by no means exhaustive. The imagination and insight of the individual research worker will give birth to efficient studies and enrich the area. This is the hope with which the present section and the study is concluded.

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